

Exhibit 27

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UNITED STATES DISTRICT COURT
DISTRICT OF NEW JERSEY

IN RE: JOHNSON &)
JOHNSON TALCUM POWDER)
PRODUCTS MARKETING)
SALES PRACTICES AND) MDL 16-2738
PRODUCT LIABILITY) (FLW)(LHG)
LITIGATION)
_____)
THIS DOCUMENT)
PERTAINS TO ALL CASES)

WEDNESDAY, DECEMBER 19, 2018

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Videotaped deposition of Laura
Plunkett, Ph.D., DABT, held at the Four
Seasons Hotel, 999 North 2nd Street, St.
Louis, Missouri, commencing at 9:12 a.m., on
the above date, before Carrie A. Campbell,
Registered Diplomate Reporter, Certified
Realtime Reporter, Illinois, California &
Texas Certified Shorthand Reporter, Missouri
& Kansas Certified Court Reporter.

- - -

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Page 3	Page 5
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<p style="text-align: right;">Page 6</p> <p>1 VIDEOGRAPHER: We are now on 2 the record. 3 My name is Jacob Arndt. I'm a 4 videographer for Golkow Litigation 5 Services. 6 Today's date is December 19, 7 2018, and the time is 9:12 a.m. 8 This deposition is being held 9 in St. Louis, Missouri, In Re: Johnson 10 & Johnson Products Marketing Sales 11 Practices, for the United States 12 District Court for the District of 13 New Jersey. 14 The deponent is Dr. Laura 15 Plunkett. 16 Will counsel please identify 17 themselves? 18 MR. MEADOWS: Ted Meadows for 19 plaintiffs. 20 MS. PARFITT: Michelle Parfitt 21 for the plaintiffs. 22 MR. BEATTIE: Ryan Beattie for 23 plaintiffs. 24 MR. TISI: Chris Tisi for 25 plaintiffs.</p>	<p style="text-align: right;">Page 8</p> <p>1 DIRECT EXAMINATION 2 QUESTIONS BY MS. BRANSCOME: 3 Q. All right. Good morning, 4 Dr. Plunkett. I introduced myself right 5 before we started, but my name is Kimberly 6 Branscome, and I am here on behalf of Johnson 7 & Johnson. 8 Is it your understanding today 9 that you are giving your deposition for the 10 purpose of a Daubert analysis in the MDL 11 related to Johnson's baby powder? 12 A. That's my understanding, yes. 13 (Plunkett Exhibit 1 marked for 14 identification.) 15 QUESTIONS BY MS. BRANSCOME: 16 Q. I want to start by handing you 17 what I will mark as Plunkett Deposition 18 Exhibit 1. 19 Do you recognize the document 20 that I just handed you? 21 A. Yes. 22 Q. Okay. Have you seen this 23 document before? 24 A. Yes. 25 Q. All right. When was this</p>
<p style="text-align: right;">Page 7</p> <p>1 MR. GOLOMB: Richard Golomb for 2 plaintiffs. 3 MR. LOCKE: Tom Locke for the 4 Personal Care Products Council. 5 MS. TINSLEY: Caroline Tinsley 6 for PTI Union, LLC, and PTI Royston, 7 LLC. 8 MR. SULLIVAN: Ryan Sullivan 9 for Imerys. 10 MS. BOCKUS: Jane Bockus for 11 Imerys. 12 MR. SMITH: William Smith for 13 Johnson & Johnson. 14 MS. BRANSCOME: Kimberly 15 Branscome for Johnson & Johnson. 16 VIDEOGRAPHER: Thank you. 17 The court reporter is Carrie 18 Campbell and will now swear in the 19 witness. 20 LAURA PLUNKETT, Ph.D., DABT, 21 of lawful age, having been first duly sworn 22 to tell the truth, the whole truth and 23 nothing but the truth, deposes and says on 24 behalf of the Defendant Johnson & Johnson, as 25 follows:</p>	<p style="text-align: right;">Page 9</p> <p>1 document provided to you? 2 A. Either earlier this -- this 3 week or late last week. I don't recall if it 4 was Friday or Monday. 5 Q. Okay. For the purposes of the 6 record, could you just identify what the 7 document is that I just handed you as 8 Plunkett Deposition Exhibit Number 1? 9 A. It's a notice of oral and 10 videotaped deposition for myself, dated -- I 11 don't see the date, but probably on the very 12 last -- do you need that or just -- is that 13 enough of an identification? 14 Q. That's all right. 15 Now, contained within the 16 deposition notice there is a reference to a 17 request for materials that are identified in 18 more detail in Schedule A. 19 Do you see that? 20 A. Yes. 21 Q. Have you reviewed Schedule A? 22 A. Yes. 23 Q. Did you bring any documents 24 with you in response to the request in 25 Schedule A?</p>

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<p>1 A. The only thing that I believe 2 that I had to bring that had not already been 3 provided was additional billing since the 4 time of my last deposition. 5 Q. Okay. And is it my 6 understanding that the documentation related 7 to additional billing that you have done 8 since your prior deposition was produced 9 yesterday at the deposition in the Forrest 10 case? 11 A. That's correct. 12 Q. All right. And the information 13 contained in the documents produced at the 14 Forrest deposition yesterday, do those 15 contain an up-to-date record of the billing 16 that you have submitted for your work in 17 connection with the litigation against 18 Johnson & Johnson? 19 A. Yes, with the understanding 20 that I haven't submitted a bill for December 21 yet. 22 Q. Okay. How much time have you 23 spent working in connection with your 24 opinions in the case against Johnson & 25 Johnson related to its baby powder in the</p>	<p>1 but I'll bill separately for the time I spent 2 yesterday right before the deposition and 3 then at the deposition, so... 4 Q. What did you do to prepare for 5 your deposition today? 6 A. I reviewed my reports, the 7 three reports that I filed in the litigation. 8 I had a meeting with attorneys on Monday, and 9 then we had a short meeting yesterday evening 10 because some attorneys arrived that were not 11 here on Monday. 12 And essentially went through 13 some of the documents that -- went through 14 some of the documents that I had cited in the 15 report in certain paragraphs, just to refresh 16 my memory of what they were. So if you want 17 me to tell you which paragraphs, I can do 18 that. 19 Q. I will in just a moment. Okay. 20 A. Want me to repeat that? I'm 21 sorry. 22 Q. That's all right. 23 Dr. Plunkett, you referenced 24 the fact that you reviewed specific 25 paragraphs of your expert reports in</p>
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<p>1 month of December? 2 A. So I'm -- on all the cases that 3 I am involved in that are pending, not just 4 this deposition? 5 Q. I'll ask first all cases and 6 then we'll narrow it to the deposition. 7 A. So in all -- 8 Q. I mean to the MDL, I'm sorry. 9 A. Okay. So in all cases this 10 month, probably eight hours so far, maybe 11 ten. 12 Q. Does that include the time that 13 you've spent attending deposition? 14 A. No, that's not including 15 yesterday's deposition time. I apologize. I 16 forgot about that. 17 Q. And how much of the eight to 18 ten hours that you have spent this month 19 working on these cases against Johnson & 20 Johnson, setting aside the time you spent in 21 deposition yesterday, relate to the MDL 22 specifically? 23 A. So it will probably be 24 billed -- it will be one bill for the 25 preparation time because the prep overlapped,</p>	<p>1 preparation for today's deposition. 2 Could you identify those 3 paragraphs for me? 4 And it's helpful to you, we can 5 go ahead and mark your three expert reports, 6 if you're referring to all three. 7 A. I'm going to refer just to the 8 MDL report because that's what we're here to 9 talk about. I mean, if you want to talk 10 about what I did to get ready for yesterday 11 separately or -- 12 MR. MEADOWS: Might be helpful 13 to go ahead and mark them. 14 MS. BRANSCOME: Why don't we go 15 ahead and just mark the three reports, 16 and then we can walk through. 17 (Plunkett Exhibits 2, 3 and 4 18 marked for identification.) 19 QUESTIONS BY MS. BRANSCOME: 20 Q. So, Dr. Plunkett, do you have a 21 copy of your three reports in front of you? 22 A. Yes, I do. 23 Q. Do those contain any markings, 24 highlightings or flags? 25 A. No, they don't.</p>

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<p style="text-align: right;">Page 14</p> <p>1 Q. Okay. Do you mind if we mark 2 your copies as the official records? 3 A. No, that's fine. 4 Q. So we will mark -- well, let's 5 do this in chronological order. So I am 6 marking as Plunkett Deposition Exhibit 7 Number 2 the expert report of Dr. Plunkett 8 dated October 5, 2016. 9 Could you confirm, 10 Dr. Plunkett, that that's what I marked as 11 Deposition Exhibit Number 2? 12 A. Yes, it is. 13 Q. And then we will mark as 14 Deposition Exhibit Number 3 supplemental 15 expert report of Dr. Laura Plunkett dated 16 August 29, 2018. 17 Dr. Plunkett, could you confirm 18 that I marked that as Exhibit Number 3? 19 A. Yes, that's correct. 20 Q. And then Exhibit Number 4, we 21 will mark the expert report dated 22 November 16, 2018, by Dr. Plunkett that was 23 produced in the MDL. 24 Could you confirm that I marked 25 that as Deposition Exhibit Number 4?</p>	<p style="text-align: right;">Page 16</p> <p>1 are also cited in paragraph 39 as well, some 2 of those same ones that are... 3 And then in Section 5 of my 4 report where I'm talking about exposure, I 5 looked again at Parmley and Woodruff. I 6 looked again at Vetner and Iturrulde and Egli 7 and Newton last night. 8 And the only other thing I 9 looked at is not cited in this report because 10 it came out after the report was filed, and 11 that was -- and I did bring a copy of that. 12 That was the risk assessment that was done in 13 Canada. Some people refer to it as -- by the 14 first author's last name, Taher, T-a-h-e-r. 15 And I may be pronouncing that wrong, but... 16 (Plunkett Exhibit 5 marked for 17 identification.) 18 QUESTIONS BY MS. BRANSCOME: 19 Q. All right. And I see that you 20 brought a copy of that document with you. 21 Just for the purposes of the record, let's 22 mark that as Plunkett Deposition Exhibit 23 Number 5. 24 Are there any markings, 25 highlightings or notations on that document?</p>
<p style="text-align: right;">Page 15</p> <p>1 A. Yes, that's correct. 2 Q. All right. And so now back to 3 the question of you referenced the fact that 4 you looked at specific paragraphs of your 5 expert report in preparation for today's 6 deposition. If you could, using Deposition 7 Exhibit Number 4, identify which paragraphs 8 you looked at specifically in preparation for 9 the deposition. 10 A. So it wasn't the paragraphs. 11 There were certain documents in paragraphs, 12 so that's what I was referring to, so... 13 So starting in paragraph 38 14 where I'm talking about sort of the timeline 15 of information about human health hazards and 16 talc dust. So I just went back and refreshed 17 on a few of the older papers. 18 I looked again at the patent 19 documents that are cited in the first bullet. 20 I looked again at a paper by 21 Eberl, 1948, which is in the last bullet. 22 The patent documents are also there as well. 23 And that -- so that would be 24 all I pulled in that paragraph. 25 I believe that those documents</p>	<p style="text-align: right;">Page 17</p> <p>1 A. No, there's not. 2 And then the other document I 3 looked at that was not cited in the report, 4 there is a printout from the government of 5 Canada website that talks about some 6 statements on talc, and so I printed that out 7 as well. This was published at the same time 8 that the risk assessment was published. 9 (Plunkett Exhibit 6 marked for 10 identification.) 11 QUESTIONS BY MS. BRANSCOME: 12 Q. All right. We'll mark that for 13 purposes of the record as Plunkett Deposition 14 Exhibit Number 6. We might come back to 15 those documents. 16 So returning briefly to the 17 deposition notice and the requests in 18 Schedule A, the billing information you 19 produced yesterday and then we just discussed 20 additional information with respect to that, 21 are there any other documents that you have 22 in your possession that are responsive to 23 requests identified in Schedule A that have 24 not been produced? 25 A. I don't believe so, no.</p>

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<p>1 Everything -- I do believe that there were 2 some objections filed to this, so there's 3 some things that I did not provide based on 4 that. 5 Some of the things I don't 6 have, too. I think you asked for -- maybe 7 you didn't ask for that. Usually people ask 8 for copies of old depositions, and I don't 9 keep those. And maybe you didn't ask for 10 that, but that's usually a request. 11 Let me see. 12 Q. Okay. Now, you mentioned that 13 you met with attorneys on Monday. And who 14 was present at that meeting? 15 A. So on Monday it was 16 Mr. Meadows, sitting here. Ms. Tucker, 17 Mr. Beattie, were at the meeting on Monday. 18 Q. All right. And how long did 19 that meeting last? 20 A. Probably six hours, I guess, 21 six hours with them, and then I also did some 22 other work on my own, but... 23 Q. Okay. And then you mentioned 24 that you had another meeting last night. 25 Who was present at that</p>	<p>1 Q. All right. And then you 2 produced a supplemental report earlier this 3 year, on August 29, 2018, and that's been 4 marked as Deposition Exhibit Number 3, 5 correct? 6 A. Yes. 7 Q. When did you begin work on the 8 supplemental report that you produced at the 9 end of August in 2018? 10 A. I want to say -- let's see. I 11 want to say sometime in the summer. Maybe as 12 early as May, but I believe May -- May, June 13 time frame of 2018. 14 My billing would reflect that, 15 so, again, we can pull my billing. And I 16 would have called it preparation of the 17 supplemental report in my billing. 18 Q. Okay. Why did you choose to 19 draft a supplemental expert report? 20 A. So over the time I had worked 21 on different trials here in St. Louis 22 particularly, additional documents that were 23 not cited in my original report became 24 reliance materials based on their 25 presentation at trial. So there were enough</p>
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<p>1 meeting? 2 A. So that was probably about an 3 hour, and that would have been Mr. Tisi -- or 4 maybe two hours. Mr. Tisi joined us 5 yesterday afternoon. And Mr. Golomb, too, 6 I'm sorry. 7 Q. All right. Okay. Now, looking 8 at the three reports that you have produced 9 in the litigation involving Johnson's baby 10 powder, I wanted to get an understanding of 11 how those three reports relate to one 12 another. 13 So you have the first report 14 that you produced that was dated October 5, 15 2016. I believe that was originally produced 16 in the Uhl case; is that correct? 17 A. I'm not sure the name of the 18 first case, but it was in the -- some of the 19 St. Louis cases, yes. 20 Q. All right. And when did you 21 begin work on that report? 22 A. You'd have to look at my 23 billing record, which I know was an exhibit 24 to yesterday's deposition. I believe they 25 started in 2015.</p>	<p>1 of those that I thought it was important to 2 add to the original report with additional 3 documents that I had reviewed over time. 4 Since October of 2016 through, 5 let's say, the summer of 2018, there were a 6 variety of additional documents that I had -- 7 I had seen. 8 It was also my understanding 9 that during that time period Johnson & 10 Johnson had provided additional documents 11 that weren't provided or available to me in 12 2016, so additional discovery that was now 13 available to look at. So some of this is a 14 matter of additional evidence that wasn't 15 available when I wrote my initial -- my 16 initial report. 17 Q. All right. Now when you say 18 the additional documents became reliance 19 materials in trial, what do you mean by that? 20 A. So additional documents that we 21 refer to in trial that I use to support 22 opinions that weren't necessarily 23 specifically cited within the body of my 24 report or described within the body of my 25 report. They were likely on my larger</p>

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<p>1 reliance list, but they weren't things that 2 were cited. 3 In other words, if you look at 4 my original report in -- when I say the body, 5 the paragraphs. I always put a reference 6 list and then I'll have Bates numbers. So 7 during trial, things that were from my larger 8 reliance list that weren't specifically 9 discussed in my report became support for 10 different opinions that -- based on questions 11 at trial. 12 Q. Okay. When you say these were 13 documents that "we" refer to at trial, you're 14 referring to yourself and attorneys 15 representing the plaintiffs? 16 A. Yes, that's correct. 17 Q. Okay. And understanding that 18 the purpose of today's deposition is focused 19 specifically on the MDL, then you produced a 20 report specific to the MDL on November 16, 21 2018, that we've marked as Exhibit 4, 22 correct? 23 A. Yes. 24 Q. When did you begin work on the 25 report that you produced specifically in the</p>	<p>1 ask who the -- who was involved in the 2 drafting of the report that was produced in 3 the MDL? 4 MR. MEADOWS: Hold on just one 5 second. 6 Ask the question one more time. 7 I want to make sure we're not 8 venturing into attorney work product 9 realm here. 10 QUESTIONS BY MS. BRANSCOME: 11 Q. Dr. Plunkett, do you consider 12 the report that you have issued in the MDL 13 which is identified as Exhibit 4 to be 14 attorney work product? 15 MR. MEADOWS: Objection. Don't 16 answer that. That calls for a legal 17 conclusion, and at this point I'm 18 going to instruct you not to answer 19 questions about how the report came 20 into be. 21 MS. BRANSCOME: Are you 22 instructing her to refuse to answer 23 any questions that involve the 24 development of her expert report? 25 MR. MEADOWS: I'm instructing</p>
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<p>1 MDL? 2 A. Sometime right after -- I would 3 say early fall of 2018, sometime after 4 this -- the supplemental report was filed. 5 Probably right after that. 6 Q. Okay. So is it fair to say 7 that you began work on your MDL report after 8 completing the supplemental expert report 9 that has been marked as Exhibit 3? 10 A. Yes, that's correct. 11 Q. Okay. Who was involved in the 12 drafting of the report that's been identified 13 as Exhibit 4? 14 MR. MEADOWS: Objection. Hang 15 on a second. 16 Are you asking about 17 communications between attorneys and 18 Dr. Plunkett? 19 QUESTIONS BY MS. BRANSCOME: 20 Q. Dr. Plunkett, none of the 21 questions I will ask you here today are 22 intended to elicit information that's 23 protected by the attorney-client privilege. 24 So setting that aside, anything 25 that you understand to be privileged, I can</p>	<p>1 her not to answer your last question. 2 QUESTIONS BY MS. BRANSCOME: 3 Q. Are you following your 4 attorney's instructions, Dr. Plunkett? 5 A. Yes. 6 MS. BRANSCOME: At this point I 7 would like to go off the record, 8 please. 9 VIDEOGRAPHER: Okay. We are 10 going off the record at 9:30 a.m. 11 (Off the record at 9:30 a.m.) 12 VIDEOGRAPHER: We are back on 13 the record at 9:32 a.m. 14 QUESTIONS BY MS. BRANSCOME: 15 Q. Dr. Plunkett, other than 16 attorneys, if attorneys were involved -- I am 17 not asking questions about that -- were there 18 any individuals who assisted you in preparing 19 the report that has been marked as Exhibit 4? 20 A. There was no one that actually 21 assisted in writing the report. I do -- when 22 I did my literature searches, I had my 23 husband help me retrieve articles that I 24 identified for retrieval, but certainly there 25 was no -- he doesn't participate in the</p>

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<p>1 actual review of articles or in drafting of</p> <p>2 the report. That's all my work.</p> <p>3 Q. Okay. And when you say that</p> <p>4 your husband retrieved articles, was this</p> <p>5 simply -- what information did you provide</p> <p>6 him in order to enable him to retrieve a</p> <p>7 particular article?</p> <p>8 A. So we use a service in Houston</p> <p>9 called Loansome Doc, which is affiliated with</p> <p>10 our local medical library system and also</p> <p>11 with the National Library of medicine and NIH</p> <p>12 libraries. So I give him an online search</p> <p>13 that I put into a clipboard. He takes that,</p> <p>14 makes the request or retrieves -- some of</p> <p>15 them will be free, and so he'll actually go</p> <p>16 to the websites for the -- and then put them</p> <p>17 into a folder for me.</p> <p>18 So he does that physical part</p> <p>19 of it through the computer, but he doesn't --</p> <p>20 he doesn't do the searches or decide which</p> <p>21 ones to retrieve. I do that.</p> <p>22 Q. Okay. Did you have any</p> <p>23 discussions with your husband about the</p> <p>24 substantive content of the report that's</p> <p>25 identified as Exhibit 4?</p>	<p>1 been marked as Exhibits 2, 3 and 4 to each</p> <p>2 other, what is your -- what is your position</p> <p>3 with respect to opinions that you have stated</p> <p>4 or language you have used in Exhibits 2 and 3</p> <p>5 that may not appear in Exhibit 4?</p> <p>6 A. I don't think I understand what</p> <p>7 your -- what you mean by my position. Are</p> <p>8 you asking --</p> <p>9 MS. PARFITT: And I'll object</p> <p>10 to that question.</p> <p>11 THE WITNESS: Are you asking me</p> <p>12 to describe -- I mean, I could</p> <p>13 describe for you the overlap. I mean,</p> <p>14 there's not complete overlap. Is that</p> <p>15 what you're asking me or --</p> <p>16 QUESTIONS BY MS. BRANSCOME:</p> <p>17 Q. I am. Why don't you take a</p> <p>18 shot at it and then I may narrow my question,</p> <p>19 but I'm just trying to understand how the</p> <p>20 reports relate to one another.</p> <p>21 MR. MEADOWS: Objection.</p> <p>22 THE WITNESS: So they relate to</p> <p>23 each other, I would say, based on</p> <p>24 timing first, because obviously the</p> <p>25 first report was two years ago, and</p>
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<p>1 A. No.</p> <p>2 Q. Does he do any evaluation --</p> <p>3 for example, if you were to provide him a</p> <p>4 search and it generates multiple documents by</p> <p>5 a given author, does he identify additional</p> <p>6 articles that you might want to consider?</p> <p>7 A. Only -- he has done that, but</p> <p>8 only with the streams of letters to the</p> <p>9 editor. So I ask him always if I'm pulling</p> <p>10 an article. Happens a lot at the New England</p> <p>11 Journal of Medicine or some of the other</p> <p>12 medical journals where there's pretty active</p> <p>13 letter to the editor correspondence that</p> <p>14 happens.</p> <p>15 So I always say to him, "If</p> <p>16 there's any citation to this through the</p> <p>17 letter to the editor comments, would you</p> <p>18 please retrieve those," and so he will do</p> <p>19 that search to look for that.</p> <p>20 Q. Okay.</p> <p>21 A. And I'm not sure that that</p> <p>22 happened in any of these articles, but I'm</p> <p>23 talking my general process that we use.</p> <p>24 Q. Okay. In terms of the</p> <p>25 relationship of the three reports that have</p>	<p>1 then many more documents. So that's</p> <p>2 how the 1 and 2 relate -- or Exhibit 2</p> <p>3 and 3 relate to each other.</p> <p>4 In the MDL litigation, I was</p> <p>5 asked to address very specific topics</p> <p>6 and things because there's a -- it's a</p> <p>7 different -- I don't know all of them,</p> <p>8 but there's a different set of experts</p> <p>9 that work in different litigations.</p> <p>10 So my role in the MDL, I</p> <p>11 believe, is set out based on this</p> <p>12 report, whereas in the original</p> <p>13 reports I may have had -- I did have a</p> <p>14 broader role in some of those cases.</p> <p>15 QUESTIONS BY MS. BRANSCOME:</p> <p>16 Q. Okay. Can you describe for me</p> <p>17 your understanding of your role in the MDL?</p> <p>18 A. It's my understanding that I</p> <p>19 have been asked to provide opinions related</p> <p>20 to the -- generally the toxicology of talcum</p> <p>21 powder products, including all the individual</p> <p>22 constituents that make up that product; to</p> <p>23 look historically back in time about what was</p> <p>24 known and when about the toxic effects of</p> <p>25 talc and different constituents within talc.</p>

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<p>1 And that was sort of the -- that's been -- 2 I consider that sort of the meat of what I've 3 been asked to do. 4 But separate from that, another 5 part important part of my testimony or things 6 I was asked to provide was an overview of the 7 regulatory process for cosmetics and then the 8 information that accumulated scientifically, 9 how that related to what a company is 10 required to do under the regulations in order 11 to provide consumers with appropriate 12 information about the safety of the product. 13 So kind of the regulatory opinions, I guess 14 you want to call it, that area. 15 I have sections on that, and I 16 think you can see that by the different 17 sections in my report where I set out 18 different general topics. 19 And then I was also asked to 20 address some of the issues related to how the 21 information on the safety of talc has been 22 disseminated publicly and also based on my 23 review of different internal company 24 documents, both from Johnson & Johnson -- or 25 from Johnson & Johnson, Imerys, as well as</p>	<p>1 the companies had, in fact, influenced the 2 regulators or PCPC? 3 MR. MEADOWS: Objection. 4 THE WITNESS: Not in my -- not 5 when I first started this process. So 6 that is -- those opinions actually go 7 back into my original report. So 8 that's not something, I don't believe, 9 that was not covered in my original 10 report or even in my supplemental 11 report. I just have different -- some 12 additional documents that I have 13 reviewed. 14 QUESTIONS BY MS. BRANSCOME: 15 Q. Okay. 16 A. And this is something when I 17 first evaluated the case and first started 18 looking at the documents, those are opinions 19 that I had formed based on my review. 20 Certainly by the time I drafted 21 the MDL report, I think if you listened to 22 my -- read my trial testimony, you understand 23 I had those opinions at the time I started 24 writing this report. 25 Q. Now, what I'd like to</p>
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<p>1 the PCPC, which is the Personal Care Products 2 Council, formerly known as the CTFA, to look 3 at those interactions and how those companies 4 set about to influence the process around the 5 safety assessment of talc over the years. So 6 different activities that happened with 7 respect to the ISRTP meetings in the '90s, 8 with respect to the NTP process at different 9 points in time. 10 The CIR process, I think I 11 cover, and I also talk a little bit about 12 IARC, I believe, as well. 13 So the interactions of the 14 industry with the science and then how that 15 science ends up getting described within -- 16 either to regulators or to bodies that are 17 reviewing the science related to the 18 products. 19 Q. You mentioned as one of the 20 categories that you were asked to opine about 21 in the MDL that you were looking to set about 22 the influence that companies may have exerted 23 over the regulatory process or PCPC. 24 When you began that analysis, 25 did you start with the predicate belief that</p>	<p>1 understand next is, are there -- of the 2 topics that you just identified that you 3 understand that you're offering opinions 4 about in the MDL, which, if any, of those 5 topics are in your view new as compared to 6 the opinions that you have offered that are 7 contained in Exhibits 2 and 3? 8 MS. PARFITT: Objection. 9 THE WITNESS: So I don't think 10 any of the MDL opinions are new. 11 QUESTIONS BY MS. BRANSCOME: 12 Q. Okay. 13 A. I think that they may have -- 14 they may -- they may cite to additional 15 documents that haven't been cited to in the 16 first two reports, but I believe there's a 17 significant overlap even on the documents 18 that are cited. 19 Q. And you mentioned that your 20 role in the MDL is more narrow than the role 21 you've served in other cases. 22 What topics have you opined 23 about in other cases that you are not 24 intending to opine about in the MDL? 25 A. So I am not doing general</p>

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<p>1 causation in the MDL, although I am indeed</p> <p>2 providing opinions on certain aspects of the</p> <p>3 cause and effect relationship such as -- you</p> <p>4 know, I talk about biologic plausibility,</p> <p>5 underlying knowledge about different</p> <p>6 toxicities of the compounds over time, but</p> <p>7 I'm not doing a full causation analysis in my</p> <p>8 MDL report, and hopefully you see that when</p> <p>9 you read the report.</p> <p>10 Q. So as you sit here today,</p> <p>11 Dr. Plunkett, you are not intending to offer</p> <p>12 the opinion in the MDL that Johnson's baby</p> <p>13 powder causes ovarian cancer; is that</p> <p>14 correct?</p> <p>15 A. Not in those words. I think if</p> <p>16 you read my report, I talk about the</p> <p>17 fact that Johnson -- it's my opinion that</p> <p>18 Johnson's baby powder increases the risk of</p> <p>19 cancer -- ovarian cancer, which is a</p> <p>20 different assessment than the way you stated</p> <p>21 it.</p> <p>22 Q. All right. And it is -- as you</p> <p>23 sit here today, Dr. Plunkett, it is your</p> <p>24 understanding that you are not being offered</p> <p>25 to give a, as you termed it, a general</p>	<p>1 principles of, first, is there a hazard, is</p> <p>2 the first step. Is there a hazard that would</p> <p>3 be relevant to human health.</p> <p>4 Then looking at the data and</p> <p>5 determining whether that -- that body of data</p> <p>6 allows you to either quantify risk in some</p> <p>7 way or to qualitatively shows you that</p> <p>8 there's a change in risk based on exposure to</p> <p>9 the product.</p> <p>10 So your statement may be as</p> <p>11 simple as there's an increased risk, or you</p> <p>12 can take data in a risk assessment and do a</p> <p>13 quantification such as in a -- a cancer risk</p> <p>14 assessment based on an animal data set. You</p> <p>15 might actually calculate a cancer potency</p> <p>16 factor, for example. Those kinds of things.</p> <p>17 That's another application of risk</p> <p>18 assessment. Same basic process but focusing</p> <p>19 just, for example, on one study.</p> <p>20 My human health risk assessment</p> <p>21 or safety assessment, like the causation</p> <p>22 analysis, does look across all kinds of data,</p> <p>23 but my goal was not to analyze the data under</p> <p>24 the Hill considerations, which is what I</p> <p>25 would typically do, in order to go through</p>
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<p>1 causation opinion in the MDL, correct?</p> <p>2 A. That's my understanding, yes.</p> <p>3 Q. Now, you mentioned that the</p> <p>4 analysis as to whether a substance increases</p> <p>5 the risk of a particular outcome is different</p> <p>6 than a causation analysis.</p> <p>7 Can you explain to me what you</p> <p>8 meant by that?</p> <p>9 A. So I discussed this yesterday</p> <p>10 in my deposition. There's -- there's a</p> <p>11 process called risk assessment. Sometime --</p> <p>12 in the area of consumer products you can also</p> <p>13 refer to it as safety assessment. And then</p> <p>14 there's the process of what I call general</p> <p>15 causation analysis, or full causation</p> <p>16 analysis.</p> <p>17 So even though the types of</p> <p>18 information that are considered may overlap</p> <p>19 between those two, the outcome or the</p> <p>20 statements or the -- the way you go about</p> <p>21 assessing the information is a bit different.</p> <p>22 Q. Explain to me how they're</p> <p>23 different.</p> <p>24 A. So in a risk assessment, the</p> <p>25 process starts with setting out some basic</p>	<p>1 the process of making that final opinion that</p> <p>2 indeed baby powder -- exposure to baby powder</p> <p>3 through genital application is a cause of</p> <p>4 ovarian cancer in women. That's -- to me,</p> <p>5 that's a different way to go about thinking</p> <p>6 about the question that you have to answer.</p> <p>7 And also the -- some of the</p> <p>8 data that you evaluate is evaluated a bit</p> <p>9 differently. So, for example, in my</p> <p>10 increase -- in my issue of increased risk, I</p> <p>11 use the epidemiology as supporting evidence,</p> <p>12 but I'm really focused on -- on -- more on</p> <p>13 the underlying sort of the biologic</p> <p>14 information that we have that identifies</p> <p>15 hazard and risk. So looking at the animal</p> <p>16 data, the exposure potential for the product,</p> <p>17 and then using that along with what we know</p> <p>18 with the human experience to characterize</p> <p>19 risk.</p> <p>20 Q. Is there a different level of</p> <p>21 certainty required to render a causation</p> <p>22 opinion than to render an opinion that</p> <p>23 there's an increased risk?</p> <p>24 A. I don't know that I'd describe</p> <p>25 it quite that way but -- because to me it's a</p>

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<p>1 different process. I certainly have to be 2 just as certain about what I say about risk 3 when I do a risk assessment as I do about -- 4 as I do when I'm doing a causation analysis. 5 I don't -- maybe you mean 6 something else, so maybe you can -- I mean, 7 I -- I certainly use the same basic standards 8 in my mind, how I weigh evidence to do the 9 different processes, but I go about them in a 10 little bit different way when I do a risk 11 assessment versus -- versus a causation 12 analysis. 13 Q. In your view, does the strength 14 of the evidence have to be greater in order 15 to determine that an agent causes a disease, 16 for example, than it does simply to say that 17 an agent increases the risk of a particular 18 outcome? 19 MR. MEADOWS: Objection. 20 THE WITNESS: I don't think 21 I've ever thought about it that way. 22 I would say to you that strength -- 23 the strength of the association is a 24 consideration under Hill that you 25 apply the epidemiology data mainly, so</p>	<p>1 statistical test you would apply, or 2 what are you asking? 3 QUESTIONS BY MS. BRANSCOME: 4 Q. So understanding that for the 5 most part if you're looking at statistical 6 significance, you're looking whether the 7 confidence interval crosses 1. 8 Are you following? 9 A. Yes, I know that, yeah. 10 Q. All right. And so when you're 11 evaluating, though, whether a particular 12 substance, in this case Johnson's baby 13 powder, increases the risk of an outcome, 14 again, in this case ovarian cancer, would it 15 be sufficient for you if that increase was 16 .01 percent, for example? 17 MR. MEADOWS: Objection. 18 THE WITNESS: That doesn't make 19 sense to me, an increase of .01 20 percent, but maybe I can answer it 21 this way for you based on what you've 22 laid out there. 23 Certainly when I do a risk 24 assessment and I make it -- if I'm 25 going to make the conclusion that I</p>
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<p>1 that is a different consideration 2 under causation than you do -- as you 3 would do it in a risk assessment. 4 But the strength of the 5 evidence, it's still a judgment based 6 on your experience and training as far 7 as whether or not there is enough 8 information to be able to say that you 9 believe that there is -- enough 10 information to say that the risk is 11 increased based on that exposure and 12 those conditions and whatever the 13 toxicity profile of that compound is. 14 QUESTIONS BY MS. BRANSCOME: 15 Q. Okay. We'll get into this more 16 a little bit later, but when you say that a 17 risk is increased, is there a threshold level 18 of increase that you need to see in order to 19 render an opinion in a court of law that an 20 agent increases the risk of a particular 21 outcome? 22 MR. MEADOWS: Objection. 23 THE WITNESS: So I need you to 24 define what you mean by threshold. 25 Are you asking me a specific</p>	<p>1 believe that it's my opinion to a 2 reasonable degree of scientific 3 certainty that exposure to baby powder 4 in women increases the risk of cancer, 5 I'm having to rely on -- I do rely on 6 data that allows me to draw 7 conclusions because either there's a 8 statistical significant finding found 9 or the -- there's a consistency among 10 the pattern of the data that shows 11 there's information that fits together 12 consistently. And maybe -- you want 13 me to explain what I mean by that? 14 No? 15 Whereas I think what you're 16 asking is when an epidemiologist 17 applies -- looks at a body of -- in a 18 causation analysis looks at a body -- 19 and I do this, too -- looks at a body 20 of epidemiological studies and you 21 weight the studies, obviously you're 22 weighting the studies differently 23 based on whether they have shown 24 statistical significance or not, 25 right?</p>

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<p>1 And it isn't that it's a one to 2 one. If you have one positive and one 3 negative, that isn't how you may 4 decide to finally weight that 5 evidence, but certainly you have to 6 consider whether or not what was seen 7 or reported is showing you something 8 reliable -- or you can make a 9 statement reliably about whether or 10 not that finding was biologically 11 significant. And biologically 12 significant would typically be linked 13 to a finding that has statistical 14 significance in an epi study unless 15 the study was not designed to be able 16 to answer the question properly. 17 So -- and I've discussed that a 18 little bit yesterday with Mr. Smith on 19 the issue of power to detect. So 20 that's something you do consider in 21 epi. 22 But, yes, statistical 23 significance certainly goes into your 24 weight of the evidence there. 25</p>	<p>1 company evaluating compliance with FDA 2 regulations with respect to cosmetics? 3 A. Yes. 4 Q. Okay. What is your experience 5 with respect to that? 6 A. So that's -- one of the clients 7 that I currently work for where I am asked to 8 provide input on advertising, promotion and 9 labeling of some of the products and then 10 also some of the ingredients that are being 11 promoted for use to -- to produce cosmetic 12 products. So it's the idea of providing that 13 advice over my understanding of the 14 regulations what can be said and can't be 15 said about certain ingredients. 16 This company is involved in 17 making both ingredients but also some 18 finished products now based on -- it's a 19 large company that owns a lot of little 20 subsidiaries. 21 Q. My question, though, 22 Dr. Plunkett, was, have you ever been in a 23 decision-making position for a company 24 evaluating compliance with FDA regulations 25 with respect to cosmetics?</p>
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<p>1 QUESTIONS BY MS. BRANSCOME: 2 Q. Okay. You talked about you're 3 intending to offer an opinion with respect to 4 what a company is required to do under the 5 regulations; is that correct? 6 A. Yes. 7 Q. Okay. What regulations are you 8 specifically referring to? 9 A. So cosmetic regulations that 10 exist within -- so it's the entire process as 11 I describe how cosmetic -- what -- are 12 cosmetics subject to regulation by FDA? Yes. 13 What are the types of things that companies 14 have to do before they're marketed, what does 15 the company have to do once the product is on 16 the market, those kinds of things. 17 Q. Have you ever worked directly 18 for any regulatory agency? 19 A. No, I have not. 20 Q. And suffice it to say you have 21 never been in a decision-making position 22 within a regulatory agency, correct? 23 A. That's correct, I have not. 24 Q. Have you ever been in a 25 decision-making position with respect to a</p>	<p>1 MS. PARFITT: Objection. Asked 2 and answered. 3 THE WITNESS: So that's what 4 I'm saying. They're relying on my 5 input to make a decision on what will 6 go in the materials. 7 QUESTIONS BY MS. BRANSCOME: 8 Q. Do you have decision-making 9 authority within that company or, as you 10 described it, are you providing advice and 11 input? 12 A. I'm providing advice, but the 13 things I'm advising on are the things that 14 happened. So in other words, they don't have 15 anybody in the company that understands the 16 process of what they can say. So I -- I 17 advise them that you need to remove this 18 language or that this is more appropriate 19 language. They make those changes, and then 20 that is what is done. 21 So I agree, I'm not an employee 22 of that company. I am a consultant working 23 with the company, but it is a little 24 different than some of the work that I do 25 where I -- what I -- the advice that I'm</p>

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<p>1 giving is actually something that I know 2 actually happened. Sometimes you give advice 3 to companies, but it doesn't -- we have no 4 idea whether the company actually follows our 5 advice. 6 Q. My question is slightly 7 different, Dr. Plunkett. 8 If you were to give advice to 9 the company that you've referenced as having 10 experience with cosmetic regulation 11 compliance that that company chose not to 12 follow, that company has the ability to 13 ignore your advice, correct? 14 A. Yes, I would imagine that they 15 could do that. 16 Q. Okay. Have you ever drafted 17 regulations that relate to cosmetics? 18 A. Actually drafted a regulation? 19 No, I have not. 20 Q. All right. You reference in 21 your report language out of 21 CFR 740.1, and 22 specifically -- you reference it in a few 23 places. And I can direct you specifically to 24 paragraph 22 in Exhibit 4. 25 A. Yes. I'm there.</p>	<p>1 A. So it's -- first off, you would 2 use the common English language definition. 3 I don't believe that those -- I haven't seen 4 a definition separate within the regulations. 5 Sometimes there will be. 6 So based on that and my 7 experience and the looking into what others 8 have described about this, this is the idea 9 of considering how the product is used, is 10 one of the -- one of the concerns that you 11 have, and whether or not the -- based on how 12 the product is used and how the product is 13 being sold, that in order to prevent a health 14 hazard, a warning hazard -- a warning 15 statement would be needed. 16 Q. Can you cite to me any language 17 within the regulation or even supporting 18 documentation, a comment, something of that 19 nature, that would define "whenever necessary 20 or appropriate" with respect to how the 21 product is used? 22 MS. PARFITT: Objection. 23 THE WITNESS: I don't think I 24 understand your question. 25 Are you asking me to cite to a</p>
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<p>1 Q. All right. And do you see here 2 you have replicated language from 21 CFR 3 740.1 that reads, "The label of a cosmetic 4 product shall bear a warning statement 5 whenever necessary or appropriate to prevent 6 a health hazard that may be associated with 7 the product"? 8 Do you see that? 9 A. Yes. 10 Q. And you added emphasis on 11 particular portions of this sentence, 12 correct? 13 A. Yes, I did that, exactly. 14 Q. All right. Now there's a 15 clause in this sentence that states, 16 "Whenever necessary or appropriate." 17 Do you see that? 18 A. Yes. 19 Q. You did not emphasize that 20 language; is that correct? 21 A. That's correct, I did not. 22 Q. What is your understanding 23 as -- what you describe as an FDA regulatory 24 specialist of the meaning of "whenever 25 necessary or appropriate" in 21 CFR 740.1?</p>	<p>1 reference or a part of the regulation 2 where they explain it, or what are you 3 asking me? Guidance document or -- 4 QUESTIONS BY MS. BRANSCOME: 5 Q. Yes. Can you point me to 6 anything other than your personal view of the 7 interpretation of this language that would 8 tie the requirement "whenever necessary or 9 appropriate" to how a product is used? 10 MS. PARFITT: Objection. Form. 11 THE WITNESS: I'll have to go 12 look for you whether there's a 13 guidance that states it that way. 14 This is based on my experience in 15 dealing with the products in the past. 16 I think that's also consistent 17 with what is described, I would say to 18 you, within -- it's consistent -- what 19 I'm describing to you, it's consistent 20 as well with how the CIR standard for 21 safety assessment is done, looking at 22 the issue of the -- of the -- of the 23 use. 24 QUESTIONS BY MS. BRANSCOME: 25 Q. When you say that you're basing</p>

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<p>1 your interpretation of the clause "whenever 2 necessary or appropriate" on your personal 3 experience, can you point me to something 4 specific? 5 MS. PARFITT: Objection. 6 THE WITNESS: Are you asking 7 me -- are you asking me if I've ever 8 had a company that I worked for that 9 that particular clause in here was 10 extremely important to how we 11 interpreted it? I don't think I can 12 point you to that. I don't recall 13 ever having to do that specifically. 14 Or is it something different 15 you're asking me? 16 QUESTIONS BY MS. BRANSCOME: 17 Q. Dr. Plunkett, I asked you what 18 your basis was for interpreting the language 19 "whenever necessary or appropriate" means 20 that it's related to how a product is being 21 used, and the answer that you provided was 22 that it was based off of your personal 23 experience. 24 So I'm asking you, what is that 25 personal experience that gives you the basis</p>	<p>1 look at my documents in order -- the 2 first part of your question, I'd have 3 to go back and look. Off the top of 4 my head, I can't tell what I would 5 point you to. 6 On the second one, I think I 7 was telling you, is I don't -- I've 8 never -- I don't have a client that 9 I've worked for where that part of the 10 language was the only issue that I had 11 to deal with when I'm looking at 12 whether or not the product needs a 13 warning or not. 14 So typically -- I'm just 15 telling you that when I have looked at 16 labeling for products and looked at 17 the issue of does it need a warning 18 statement, when I'm reading it as 19 "whenever necessary or appropriate," 20 I'm looking at whether or not the 21 ingredient that I'm concerned about 22 within the product, how that is used 23 or what the exposure pattern would be, 24 route of exposure, how those things 25 might relate to how I would assess the</p>
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<p>1 for that specific interpretation? 2 MR. MEADOWS: Objection. 3 MS. PARFITT: Objection. 4 THE WITNESS: So it's in my 5 experience in dealing with companies 6 that make products and what types of 7 warnings are put or not put onto -- or 8 not -- or on labeling. So I don't 9 know how else to answer it other than 10 that. 11 I can go back and look at the 12 guidance documents to see if that is 13 described in another way, but I don't 14 recall that. 15 QUESTIONS BY MS. BRANSCOME: 16 Q. So as you sit here today, 17 you're not able to provide me either with a 18 third-party document or an independent 19 document interpreting "whenever necessary or 20 appropriate" as you've suggested today, nor 21 can you give me specific example from your 22 personal experience; is that correct? 23 MS. PARFITT: Objection. 24 THE WITNESS: Well, I 25 certainly -- I'd have to go back and</p>	<p>1 safety issue at hand. And so that's 2 what I'm trying to tell you. 3 QUESTIONS BY MS. BRANSCOME: 4 Q. Okay. You also have -- 5 changing topics a little bit, in this -- in 6 your report marked as Exhibit 4, if you could 7 turn to paragraph 10. 8 On page 7, you state on the 9 first paragraph on page 7, "In other 10 instances I have directed others to perform 11 searches on my behalf," and this is with 12 respect to identifying documents for review 13 in forming your opinions. 14 What did you mean by that? 15 A. So in addition to doing my own 16 searches of the database, sometimes I -- I 17 have called the attorney's office and asked 18 them to -- to do a search for certain things 19 that I'm looking for to add to. So in other 20 words, I have a document I've identified. 21 I'm looking for other documents like that in 22 the large millions and millions of documents 23 that are available. And so sometimes I will 24 ask attorneys to do -- to look in the 25 database for other documents like the ones</p>

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<p>1 that I've identified.</p> <p>2 Q. And without getting into</p> <p>3 anything that would be -- that would call for</p> <p>4 information protected by the attorney/client</p> <p>5 privilege or attorney work product, what</p> <p>6 percentage of the overall searches for</p> <p>7 relevant documents from these particular</p> <p>8 databases that are discussed in paragraph 10</p> <p>9 would you say that you have done yourself as</p> <p>10 opposed to directed others to do?</p> <p>11 A. Well, initially when I first</p> <p>12 started searching, those were my own searches</p> <p>13 exclusively. I would say that more recently,</p> <p>14 in the last year, since I haven't added any</p> <p>15 real new areas but there's new documents that</p> <p>16 have become available, so anything -- any of</p> <p>17 the searches probably in the last year that</p> <p>18 dealt with new discovery that was produced, I</p> <p>19 would have asked the attorneys to do some of</p> <p>20 the searching in that for me. Like I'm</p> <p>21 looking for documents that are similar to</p> <p>22 this document that I cited in my original</p> <p>23 report around this same frame that may be</p> <p>24 discussing this same topic area.</p> <p>25 So in the last year I have</p>	<p>1 A. So that might cross over into</p> <p>2 work product because it's not my database,</p> <p>3 but I don't know how to answer that. I mean,</p> <p>4 I'm sure -- it's very possible that in the</p> <p>5 database you can track that, but I -- I don't</p> <p>6 know.</p> <p>7 MR. MEADOWS: Okay.</p> <p>8 THE WITNESS: I don't have</p> <p>9 anything saved on my computer that</p> <p>10 way, but when you go to the database</p> <p>11 itself, it's possible you could track</p> <p>12 that. I just don't have a record on</p> <p>13 my computer in my office.</p> <p>14 QUESTIONS BY MS. BRANSCOME:</p> <p>15 Q. When you made the decision at</p> <p>16 some point in time -- it may have been even</p> <p>17 prior to you issuing your first report --</p> <p>18 that you wanted to look at company documents,</p> <p>19 did you set out specific categories of</p> <p>20 documents that you wanted to review?</p> <p>21 A. Not so much categories but key</p> <p>22 words. So -- and areas. I guess areas is</p> <p>23 what I -- yes, I was focusing, for example,</p> <p>24 in my initial report on documents that</p> <p>25 described what was known -- what the company</p>
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<p>1 asked them to do that more than I have done</p> <p>2 it, but initially it was what I did</p> <p>3 initially.</p> <p>4 Q. Okay. Do you keep any records</p> <p>5 of the various document searches either that</p> <p>6 you have performed or you have asked to be</p> <p>7 performed?</p> <p>8 A. No, I don't. My record would</p> <p>9 be -- the initial -- the record would have</p> <p>10 been what I listed in my reliance list for</p> <p>11 you in the initial report, but since then it</p> <p>12 would just be what is going to be changing</p> <p>13 within my reliance list, looking at</p> <p>14 additional documents. That's the only way I</p> <p>15 could identify for you. That would be my --</p> <p>16 my trail to know what was new and what was</p> <p>17 not.</p> <p>18 Q. My question is slightly</p> <p>19 different. Understanding that you have</p> <p>20 provided to some extent a record of the</p> <p>21 documents, my question is: Do you have any</p> <p>22 type of record for the nature of the</p> <p>23 searches, what it was that you set out to</p> <p>24 identify in the database and how did you go</p> <p>25 about finding those documents?</p>	<p>1 was discussing about cancer, ovarian cancer,</p> <p>2 cancer generally. So that was a key word</p> <p>3 used.</p> <p>4 And then I also was linking</p> <p>5 that in different searches with different</p> <p>6 time periods such as the NTP review process</p> <p>7 and dates. You can, you know, narrow down by</p> <p>8 dates or by the CIR process. Those kinds of</p> <p>9 things.</p> <p>10 So I did start with that,</p> <p>11 trying to understand what -- what is -- what</p> <p>12 was in the company files or in the files I</p> <p>13 had access to, the database, that dealt with</p> <p>14 those kinds of things because those aren't</p> <p>15 things that I could get to publicly.</p> <p>16 Obviously in the literature. So I had to --</p> <p>17 if I wanted to understand what the company</p> <p>18 knew, I had to go into their database to find</p> <p>19 out, you know, what they knew -- what they</p> <p>20 knew or were discussing over time about the</p> <p>21 ovarian cancer issue or about asbestos in</p> <p>22 talc or about CIR process, things like that.</p> <p>23 Q. Using the reports that you have</p> <p>24 produced, Exhibits 2, 3 and 4, really, and</p> <p>25 the full -- the entirety of the materials</p>

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<p style="text-align: right;">Page 58</p> <p>1 that you have produced in the MDL, is there</p> <p>2 any way that someone reviewing those</p> <p>3 documents, and those documents alone, could</p> <p>4 replicate the searches that you have</p> <p>5 conducted in the company databases?</p> <p>6 MR. MEADOWS: Objection.</p> <p>7 THE WITNESS: I don't know.</p> <p>8 That's a good question. I've never</p> <p>9 thought about whether you could</p> <p>10 replicate or not.</p> <p>11 I mean, I think I've told you</p> <p>12 what I did. My strategy was to focus</p> <p>13 on topic areas. So I think you</p> <p>14 might -- by topic areas, if you use</p> <p>15 the same kinds of topics areas as</p> <p>16 described, I think you would come up</p> <p>17 with documents that -- what it focused</p> <p>18 down to.</p> <p>19 For example, I also would</p> <p>20 sometimes, as linking those words, I</p> <p>21 might put in J&J documents only or</p> <p>22 Imerys documents only, because the</p> <p>23 database has a variety -- and the</p> <p>24 PCPC. There's some different ways by</p> <p>25 the Bates numbers that you can</p>	<p style="text-align: right;">Page 60</p> <p>1 reliance list, that you read, but then once</p> <p>2 you started reading decided weren't relevant</p> <p>3 to the opinions that you were offering?</p> <p>4 A. I would have to look to answer</p> <p>5 that for you. I don't know. If you want me</p> <p>6 to do that, I'd have to look.</p> <p>7 Q. I ask you more as a process</p> <p>8 matter.</p> <p>9 A. Oh.</p> <p>10 Q. If you pull an article and you</p> <p>11 start reading it and you realize that it is</p> <p>12 not relevant to the opinions that you offered</p> <p>13 in this case, the example that you just gave,</p> <p>14 is it something that you would include in</p> <p>15 your reliance list?</p> <p>16 A. Yes, I -- I have given you</p> <p>17 everything I retrieved. So if I retrieved</p> <p>18 it, you would have, yes, absolutely.</p> <p>19 Q. Okay. So it's fair to say of</p> <p>20 the articles that are on your reliance list,</p> <p>21 you could not say as you sit here today that</p> <p>22 you have read each and every word of each and</p> <p>23 every one of them, correct?</p> <p>24 A. That's correct. And I could</p> <p>25 probably tell you -- I could give you a</p>
<p style="text-align: right;">Page 59</p> <p>1 segregate documents as well. But I</p> <p>2 don't know other than that. That's</p> <p>3 all I can tell you.</p> <p>4 QUESTIONS BY MS. BRANSCOME:</p> <p>5 Q. You would agree with me that</p> <p>6 your report does not contain a complete</p> <p>7 explanation of the process by which you</p> <p>8 identify company documents to review,</p> <p>9 correct?</p> <p>10 A. I haven't laid out my search</p> <p>11 structure, that is true.</p> <p>12 Q. All right. Now, the articles</p> <p>13 that you have listed on your reliance list,</p> <p>14 have you read each and every one of those</p> <p>15 articles?</p> <p>16 A. Unfortunately, yes, over time I</p> <p>17 have. Some of them I have only read parts of</p> <p>18 them. For example, if I started reading a</p> <p>19 document and I felt that it was something I</p> <p>20 pulled that really wasn't directly on point</p> <p>21 for an area I'm covering, I may not have read</p> <p>22 every word, but certainly I have been through</p> <p>23 each of those, yes.</p> <p>24 Q. Are there any articles in your</p> <p>25 reliance list, that you maintained on your</p>	<p style="text-align: right;">Page 61</p> <p>1 little guidance in that possibly if I went to</p> <p>2 my list, I could try to pull some out that I</p> <p>3 recognize, but that's all I would be able to</p> <p>4 do for you.</p> <p>5 Q. Okay. How did you go about</p> <p>6 identifying what articles you wanted to</p> <p>7 review in forming your opinions in the MDL?</p> <p>8 A. So first off, I went back to</p> <p>9 what I already had. So my MDL report is a --</p> <p>10 is a compilation of a lot of material that's</p> <p>11 in my first few reports. That was the basis</p> <p>12 for some of the things that went into it.</p> <p>13 So I didn't -- I did do,</p> <p>14 though, a updating on literature searches for</p> <p>15 the MDL report, looking for anything new, for</p> <p>16 example, in the area, especially the area of</p> <p>17 cancer data or reports of dealing with</p> <p>18 ovarian cancer either -- or any articles</p> <p>19 dealing with the link between inflammation</p> <p>20 and cancer, ovarian cancer, generally.</p> <p>21 That's one of the areas I updated looking at.</p> <p>22 And then I did -- I don't think</p> <p>23 I did any large, new searches, however,</p> <p>24 because honestly the areas covered here are a</p> <p>25 little narrower than what was covered here.</p>

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<p>1 I don't believe that there was any from the</p> <p>2 published -- the publicly available medical</p> <p>3 literature. There wasn't a need to do a</p> <p>4 whole new area of search. It was more</p> <p>5 updating the things that I've done in the</p> <p>6 past.</p> <p>7 So it's a real easy search to</p> <p>8 update because you can just put in talc and</p> <p>9 cancer and just look at -- get lots, but you</p> <p>10 can then just start chronologically and look</p> <p>11 what was published in the last year, for</p> <p>12 example.</p> <p>13 Q. Okay. Earlier when we were</p> <p>14 discussing the fact that you in some</p> <p>15 instances have asked your husband to pull</p> <p>16 articles, have you maintained any records of</p> <p>17 the searches that you have done with respect</p> <p>18 to scientific literature, including the</p> <p>19 searches that you have asked your husband to</p> <p>20 do?</p> <p>21 A. I have not. It's possible that</p> <p>22 there are records on billing from the library</p> <p>23 that tells you how many I ordered at</p> <p>24 different times, but that is the only</p> <p>25 records, because we do have to pay the</p>	<p>1 referring to the reliance list, are you</p> <p>2 referring to the list of articles that begins</p> <p>3 on page 40 of Exhibit 4, or is there a</p> <p>4 separate document?</p> <p>5 A. There's a separate document.</p> <p>6 So it -- that's -- I usually call reliance</p> <p>7 list the separate document. I call this</p> <p>8 references cited. So I apologize for that</p> <p>9 confusion.</p> <p>10 So these, I have read every</p> <p>11 word. If it's in my reference list, those</p> <p>12 are not an issue of not having read every</p> <p>13 word, and these should all be cited somewhere</p> <p>14 in the report.</p> <p>15 Q. Okay. If you could turn to</p> <p>16 paragraph 21 in your initial report.</p> <p>17 A. Yes, I'm there.</p> <p>18 Q. Okay. So we're looking at</p> <p>19 paragraph 21 in Exhibit 2. This is on</p> <p>20 page 10.</p> <p>21 Do you see there is a sentence</p> <p>22 here that refers to -- it's referring</p> <p>23 generally to the topic of the ability of talc</p> <p>24 to migrate from the site of application to</p> <p>25 the ovaries.</p>
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<p>1 library for the retrieval.</p> <p>2 Q. Okay. And if I understood what</p> <p>3 you said earlier correctly, you indicated</p> <p>4 that any article you have ever pulled for</p> <p>5 review, you have listed on your reliance</p> <p>6 list; is that correct?</p> <p>7 A. Yes. And when I -- and let's</p> <p>8 just make sure we're talking about the same</p> <p>9 thing.</p> <p>10 So, you know, in my reports I</p> <p>11 typically have articles cited in the report</p> <p>12 separate from the reliance list. So I'm</p> <p>13 talking about the reliance list, right?</p> <p>14 Okay.</p> <p>15 So -- because I do -- I do</p> <p>16 usually -- I don't know whether I did that in</p> <p>17 this report, but I typically have a list of</p> <p>18 articles cited at the back called references,</p> <p>19 that is, things that you're actually seeing</p> <p>20 in the report body, and then there should be</p> <p>21 a separate reliance list sent to you as an</p> <p>22 appendix. I don't know what the appendix</p> <p>23 was.</p> <p>24 Q. Well, so then let's clarify</p> <p>25 that. So, Dr. Plunkett, when you're</p>	<p>1 Do you see that?</p> <p>2 A. Yes.</p> <p>3 Q. And then the next sentence</p> <p>4 states, "This issue was discussed by</p> <p>5 scientific and regulatory bodies that review</p> <p>6 the toxicokinetics of talc."</p> <p>7 Do you see that?</p> <p>8 A. Yes.</p> <p>9 Q. And in parentheses it</p> <p>10 identified EPA 1992, IARC 2010, and CIR 2013.</p> <p>11 Do you see that?</p> <p>12 A. Yes.</p> <p>13 Q. Okay. And then if you could</p> <p>14 turn to Exhibit 4, which is your MDL report,</p> <p>15 at paragraph 43. It's on page 28.</p> <p>16 Are you with me?</p> <p>17 A. Yes, I am.</p> <p>18 Q. You see that the exact same</p> <p>19 sentence appears -- well, not the exact same.</p> <p>20 It's been slightly modified to combine the</p> <p>21 first two sentences. But here you cite only</p> <p>22 to EPA 1992 and IARC 2010.</p> <p>23 Why did you remove CIR 2013?</p> <p>24 A. Because of my further</p> <p>25 evaluation since my initial report in 2016 of</p>

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<p>1 the process that was involved in the drafting</p> <p>2 of the CIR and the actual production of the</p> <p>3 report.</p> <p>4 Q. Is it your position that the</p> <p>5 migration of talc was not evaluated as part</p> <p>6 of CIR 2013?</p> <p>7 A. No. That's not my position,</p> <p>8 no.</p> <p>9 Q. Okay. And so would the</p> <p>10 sentence that's contained in paragraph 43 in</p> <p>11 Exhibit 4, which is your MDL report, if you</p> <p>12 cited to CIR 2013 in the parenthetical there,</p> <p>13 would that not be an accurate citation?</p> <p>14 A. I believe it would not be an</p> <p>15 accurate citation because I have formed</p> <p>16 opinions about the reliability of that</p> <p>17 document at this point in time.</p> <p>18 So it has to do with -- I'm</p> <p>19 citing to authorities here that I believe are</p> <p>20 reliable as far as the discussion that I see,</p> <p>21 and it's a different -- I have a different</p> <p>22 opinion now about the CIR report, which I lay</p> <p>23 out in pretty detail, I think.</p> <p>24 In fact, if you go to my</p> <p>25 section following this now in -- you'll</p>	<p>1 another question. In paragraph 43, you added</p> <p>2 two studies from your prior -- that were --</p> <p>3 that did not appear in your prior report, and</p> <p>4 it was Gardner 1981 and Edelstam 1997. This</p> <p>5 related to animal studies showing that in</p> <p>6 some species talc can migrate from the lower</p> <p>7 to the upper genital tract?</p> <p>8 A. Yes.</p> <p>9 Q. Okay. Were those studies that</p> <p>10 you were aware of before drafting your prior</p> <p>11 reports?</p> <p>12 A. I don't know that they -- I</p> <p>13 can't answer that without looking at my</p> <p>14 reliance materials for the original report.</p> <p>15 I did identify additional articles, and</p> <p>16 there's also additional articles cited here</p> <p>17 in earlier paragraph 43 that were not cited</p> <p>18 in my original report as well. I don't think</p> <p>19 I had the -- the Kunz article then cited.</p> <p>20 I'd have to go back and look.</p> <p>21 So it's possible that they were</p> <p>22 in my -- when I say my reliance materials, my</p> <p>23 original report also had a larger list of</p> <p>24 literature I didn't cite. So I'd have to</p> <p>25 look. I can't tell you whether I had them or</p>
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<p>1 understand one of the issues I had was the --</p> <p>2 the difference in the evidence that was</p> <p>3 actually available once you dig into it a</p> <p>4 little further versus what they actually</p> <p>5 reviewed. That's one of the issues.</p> <p>6 Q. And I'll follow up with some</p> <p>7 more questions about the CIR, but my question</p> <p>8 here is, the sentence in your report simply</p> <p>9 states, "The migration of talc internally</p> <p>10 after perineal application was discussed by</p> <p>11 scientific and regulatory bodies that review</p> <p>12 the toxicokinetics of talc."</p> <p>13 Would it be inaccurate to say</p> <p>14 that as part of the CIR 2013 process that</p> <p>15 body did, in fact, discuss the migration of</p> <p>16 talc internally after perineal application?</p> <p>17 A. It is true that they did</p> <p>18 discuss it. I just have an issue with the</p> <p>19 reliability of their findings.</p> <p>20 Q. And so you made the decision to</p> <p>21 just remove it from the citation; is that</p> <p>22 correct?</p> <p>23 A. Yes, at this point -- at this</p> <p>24 point, at this report, that's exactly right.</p> <p>25 Q. All right. And then I had</p>	<p>1 I did not.</p> <p>2 Q. Okay. With respect to Edelstam</p> <p>3 1997 study, do you happen to know the title</p> <p>4 of that article? Even an approximation would</p> <p>5 work.</p> <p>6 A. It'll be -- should be back</p> <p>7 here. Just a second. If it's not here,</p> <p>8 that's a mistake.</p> <p>9 Oh, here it is. "Retrograde</p> <p>10 migration of starch in the genital tract of</p> <p>11 rabbits."</p> <p>12 Q. So you are citing that article</p> <p>13 for the proposition that animal studies have</p> <p>14 demonstrated that talc can migrate from the</p> <p>15 lower to upper genital tract?</p> <p>16 A. Yes, I'm citing it because it's</p> <p>17 relevant to the issue of particle migration,</p> <p>18 which talc is a particle. So, yes, that's</p> <p>19 correct.</p> <p>20 Q. Okay. But that study did not</p> <p>21 specifically deal with talc migration,</p> <p>22 correct?</p> <p>23 A. No. Well, it -- it's relevant</p> <p>24 to talc migration, but you're exactly right,</p> <p>25 they looked at the starch migration, yes. Or</p>

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<p>1 particles that were starch, yes.</p> <p>2 Q. We'll cover this in more</p> <p>3 detail, but is it your opinion that all</p> <p>4 particles have similar characteristics with</p> <p>5 respect to their ability to migrate in the</p> <p>6 genital tract?</p> <p>7 A. It's my -- I don't know if I'd</p> <p>8 state it quite that way. What I would say is</p> <p>9 that the evidence shows that particles</p> <p>10 generally have the ability to move up the</p> <p>11 reproductive tract in women, yes, and that if</p> <p>12 a particle is one that is similar to talc or</p> <p>13 some of the other ones where the information</p> <p>14 has been collected, I would characterize that</p> <p>15 as being within that, quote/unquote,</p> <p>16 relevance of particles.</p> <p>17 That doesn't mean all</p> <p>18 particles, but certainly in the ones that I</p> <p>19 have looked at and the data I've relied upon,</p> <p>20 there's a variety of different types of</p> <p>21 particles or substances that have been</p> <p>22 studied and shown to be able to migrate.</p> <p>23 Q. So let's take Edelstam 1997 as</p> <p>24 an example.</p> <p>25 Did you do any analysis that</p>	<p>1 genital tract?</p> <p>2 MS. PARFITT: Objection.</p> <p>3 THE WITNESS: Again, I haven't</p> <p>4 done an in-depth analysis. I mean, as</p> <p>5 a toxicologist, there are differences</p> <p>6 between starch and talc, absolutely.</p> <p>7 For example, starch would -- I would</p> <p>8 expect to be more easily solubilized</p> <p>9 within fluids, and so that could</p> <p>10 affect the ability of them to actually</p> <p>11 not migrate as well as a talc</p> <p>12 particle, which would be less soluble</p> <p>13 than the starch would be.</p> <p>14 And there's -- I even --</p> <p>15 there's a paper I have in here, and I</p> <p>16 can look for it if you want, that</p> <p>17 talks about that difference, and it's</p> <p>18 one of the issues of cornstarch versus</p> <p>19 talc, on whether or not you would</p> <p>20 expect to get the long-term chronic</p> <p>21 responses with the difference between</p> <p>22 those two substances.</p> <p>23 So I do think there's</p> <p>24 difference, absolutely, as</p> <p>25 toxicologists generally. And the only</p>
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<p>1 you can point me to that establishes that</p> <p>2 starch would have a similar migration pattern</p> <p>3 as talc?</p> <p>4 A. So I would say that the paper</p> <p>5 itself shows -- talks about the movement of</p> <p>6 starch, but are you asking something</p> <p>7 different?</p> <p>8 Are you asking me have I done a</p> <p>9 specific analysis of any differences that may</p> <p>10 occur between the migration pattern of starch</p> <p>11 and talc? Is that what you're asking me?</p> <p>12 Q. That is what I'm asking you.</p> <p>13 A. I certainly didn't do an</p> <p>14 in-depth analysis of the differences, no, but</p> <p>15 based upon my review of the literature, I</p> <p>16 believe that that paper is relevant to the</p> <p>17 overall question of migration of particulate</p> <p>18 through the reproductive tract, including</p> <p>19 particles of talc.</p> <p>20 Q. Regardless of whether or not it</p> <p>21 was an in-depth analysis, can you point me to</p> <p>22 anything other than just your belief after</p> <p>23 having read these articles that starch and</p> <p>24 talc would have similar migratory</p> <p>25 characteristics in the human or animal</p>	<p>1 reason I'm citing this paper is</p> <p>2 because I'm trying to be complete</p> <p>3 about people that have looked at this</p> <p>4 issue. And certainly it was a study</p> <p>5 that looked at this issue and talks</p> <p>6 about the movement.</p> <p>7 But I wouldn't expect starch</p> <p>8 and the talc to have the same</p> <p>9 liabilities, and I also wouldn't</p> <p>10 expect them to move exactly the same</p> <p>11 speed maybe. That's very true.</p> <p>12 QUESTIONS BY MS. BRANSCOME:</p> <p>13 Q. So you would agree with me that</p> <p>14 Edelstam is not a study demonstrating that</p> <p>15 talc can migrate from the lower to upper</p> <p>16 genital tract, correct?</p> <p>17 MS. PARFITT: Objection. Form.</p> <p>18 THE WITNESS: I wouldn't say it</p> <p>19 that way. What I would say instead is</p> <p>20 that Edelstam is a study that forms</p> <p>21 the overall weight of the evidence for</p> <p>22 the ethics -- for the studies that are</p> <p>23 available that address the issue of</p> <p>24 migration, but certainly it is not</p> <p>25 studying talc. So I don't disagree</p>

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<p>1 with you there.</p> <p>2 Unfortunately, the majority of</p> <p>3 the information that I have relied</p> <p>4 upon, and others such as the FDA in</p> <p>5 making their statements about</p> <p>6 migration, is not all directed studies</p> <p>7 just to talc. It's looking at the</p> <p>8 issue of particle movement.</p> <p>9 QUESTIONS BY MS. BRANSCOME:</p> <p>10 Q. Now, in terms of doing your</p> <p>11 risk assessment -- well, let me get back. We</p> <p>12 covered this earlier, and I want to return to</p> <p>13 it for a moment. Just to confirm: For your</p> <p>14 work in the MDL, you did not do a Bradford</p> <p>15 Hill analysis, correct?</p> <p>16 A. I did not sit down and do a</p> <p>17 Bradford Hill analysis when I started writing</p> <p>18 this report. I have done a Bradford Hill</p> <p>19 analysis in the past, which is in my original</p> <p>20 reports, but I certainly did not redo a</p> <p>21 Bradford Hill when I sat down to draft my MDL</p> <p>22 report, that is true.</p> <p>23 Q. Okay. Let me be more precise.</p> <p>24 In the report that you have</p> <p>25 produced that contains a description of your</p>	<p>1 assessment.</p> <p>2 Q. Okay. What publication would</p> <p>3 you direct me to that has used the same</p> <p>4 methodology that you have used to reach your</p> <p>5 opinions in Exhibit 4?</p> <p>6 A. I think I cite you to -- cite</p> <p>7 you to some of those. You could -- well, the</p> <p>8 directly relevant one would be looking at the</p> <p>9 chapter on risk -- toxicology in the</p> <p>10 reference manual on scientific evidence.</p> <p>11 You can also go to the NRC</p> <p>12 report where they -- it lays out the</p> <p>13 different steps that you use when you kind of</p> <p>14 break data apart into exposure versus</p> <p>15 response information.</p> <p>16 And then I cite to -- there are</p> <p>17 some guidance documents that I cite to, and</p> <p>18 this is in paragraph 13. And I'd have to</p> <p>19 pull them out again to tell you which ones</p> <p>20 relate to different pieces because some of</p> <p>21 these are -- some of these documents are</p> <p>22 specific to only, for example, maybe one part</p> <p>23 of what I did.</p> <p>24 But certainly the risk</p> <p>25 assessment process at IARC is -- they do what</p>
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<p>1 opinions in the MDL, you have not set forth a</p> <p>2 Bradford Hill analysis in that document which</p> <p>3 is identified as Exhibit 4, correct?</p> <p>4 A. That is true, yes.</p> <p>5 MS. PARFITT: Objection.</p> <p>6 QUESTIONS BY MS. BRANSCOME:</p> <p>7 Q. And in fact, the paragraph that</p> <p>8 you -- or paragraphs that you have in your</p> <p>9 prior reports that reference a Bradford Hill</p> <p>10 analysis, those have not -- those have</p> <p>11 actually not been replicated in any form in</p> <p>12 Exhibit 4, correct?</p> <p>13 A. Yes, because, again, it was not</p> <p>14 my role to do general cause.</p> <p>15 Q. Okay. So then when we look at</p> <p>16 the methodology that you employed in reaching</p> <p>17 your opinions that are contained here in</p> <p>18 Exhibit 4, how would you characterize the</p> <p>19 methodology?</p> <p>20 A. As I have in the report. I</p> <p>21 talk about it being a risk assessment or a</p> <p>22 safety assessment, that you could use those</p> <p>23 terms interchangeably here. And then I've</p> <p>24 also used a weight of the evidence as a tool</p> <p>25 to go through the different steps of the risk</p>	<p>1 I call a hazard assessment. They identify</p> <p>2 hazard and they couldn't quantify risk, but</p> <p>3 the steps they go through are essentially the</p> <p>4 same types of steps that I went through as</p> <p>5 far as gathering data on not just response</p> <p>6 but also the potential for exposure and how</p> <p>7 that relates to the response.</p> <p>8 And then also the data that</p> <p>9 I've collected on the biologic effects of</p> <p>10 talc, toxicology of talc, are also discussed</p> <p>11 within that document as well.</p> <p>12 Q. Okay. Focusing specifically on</p> <p>13 the weight of the evidence tool, as you</p> <p>14 describe it, is there a particular document</p> <p>15 or publication that I would go to that could</p> <p>16 lay out the same process that you used for</p> <p>17 how you weighted certain pieces of evidence?</p> <p>18 A. So the documents that I've</p> <p>19 cited for you in paragraph 13 talk about what</p> <p>20 weight of the evidence is generally, but if</p> <p>21 you read what it is, it's essentially a</p> <p>22 process that each scientist brings their</p> <p>23 experience, training and judgment to.</p> <p>24 So I try to lay out for you in</p> <p>25 my discussion of the literature my thought</p>

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<p>1 process as I review each piece of</p> <p>2 information, and that is what you do as part</p> <p>3 of weight of the evidence. You gather all of</p> <p>4 the relevant information that you can find</p> <p>5 that address the question you're trying to</p> <p>6 answer, and since I'm looking at both</p> <p>7 exposure and response, I gather different</p> <p>8 pools of information.</p> <p>9 Q. You would agree that there are</p> <p>10 ways to do a weight of the evidence</p> <p>11 assessment of published literature that</p> <p>12 assign, for example, quantitative values to</p> <p>13 particular pieces of evidence, correct?</p> <p>14 A. Certain individuals have put</p> <p>15 together, but there's no one general accepted</p> <p>16 process that everyone uses. So I -- that's</p> <p>17 the issue. Again, there are certain --</p> <p>18 certain cases where I've seen that done, and</p> <p>19 then there are many -- most cases that it's</p> <p>20 not what's done.</p> <p>21 Q. Okay.</p> <p>22 A. Another body, by the way, that</p> <p>23 I -- it's new. It's not in paragraph 13. I</p> <p>24 just want to make sure I tell you that so</p> <p>25 we're clear. If you look at the Canadian</p>	<p>1 Q. Okay. As you were forming your</p> <p>2 opinions, Dr. Plunkett, about whether or not</p> <p>3 there is a risk associated with the use of</p> <p>4 Johnson's baby powder with respect to ovarian</p> <p>5 cancer, how do you keep track of the pieces</p> <p>6 of scientific evidence that you have reviewed</p> <p>7 and the respective weight that you give to</p> <p>8 them?</p> <p>9 Presumably you did not read</p> <p>10 everything in one day, for example?</p> <p>11 A. No. That's correct. So I</p> <p>12 typically will -- I typically will save the</p> <p>13 papers -- when I read the papers, I will</p> <p>14 often highlight in yellow information that I</p> <p>15 think is going to -- will be extremely</p> <p>16 relevant. I don't put notes on the document.</p> <p>17 I highlight in yellow on the PDF file to use</p> <p>18 that to write.</p> <p>19 And I also start drafting</p> <p>20 report very early, which then gets</p> <p>21 overwritten and actually ends up looking like</p> <p>22 an outline that eventually becomes the</p> <p>23 report.</p> <p>24 So one of the ways I keep track</p> <p>25 of things is I may put a paragraph name that</p>
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<p>1 document, they also -- in fact, a lot of what</p> <p>2 they have, you'll see the same literature</p> <p>3 described within my assessment as well.</p> <p>4 Q. So using the Canadian</p> <p>5 assessment as an example, for instance, in</p> <p>6 that assessment there were actually values</p> <p>7 assigned to particular pieces of literature,</p> <p>8 correct?</p> <p>9 A. Mainly the epidemiological</p> <p>10 literature, that is true. Again, but I'm not</p> <p>11 doing causation, so I didn't approach it that</p> <p>12 way.</p> <p>13 But certainly if you look at</p> <p>14 what I did, it's consistent with that because</p> <p>15 I talk about the differences between the</p> <p>16 limitations of a case-control versus a</p> <p>17 prospective study. I talk about both the</p> <p>18 positives and the negatives within the</p> <p>19 database, but I don't lay it out in a table</p> <p>20 like they do. But it's certainly the same</p> <p>21 basic process.</p> <p>22 I was actually quite surprised</p> <p>23 at how similar the database of information</p> <p>24 that they reviewed was to what I honed in on</p> <p>25 as well.</p>	<p>1 I know I'm going to write, such as exposure</p> <p>2 migration, and then I -- as I'm reading a</p> <p>3 paper, I'll type in a paper -- the ones that</p> <p>4 I believe are important to my overall</p> <p>5 assessment. So I will do that as I'm -- as</p> <p>6 I'm going through the evidence.</p> <p>7 So that's one of the tools I</p> <p>8 use, but I don't keep notes. I just kind of</p> <p>9 use that as a living document that eventually</p> <p>10 becomes a report.</p> <p>11 Q. Do your opinions ever change as</p> <p>12 you read additional pieces of scientific</p> <p>13 evidence?</p> <p>14 A. Yes, it does. It may change.</p> <p>15 And it often -- often the changes, though,</p> <p>16 are not that I believe -- with the exception</p> <p>17 of epidemiology. In other areas.</p> <p>18 Epidemiology is a little bit different issue</p> <p>19 when you're reviewing studies.</p> <p>20 But on toxicology I always</p> <p>21 start with reviews and regulatory</p> <p>22 authorities, looking at what others have said</p> <p>23 generally about the toxicology. And so even</p> <p>24 though I may refine opinions differently or I</p> <p>25 might change, I certainly wouldn't agree to</p>

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<p>1 work on a project to start with if my initial</p> <p>2 reviews on hazard, for example, didn't</p> <p>3 convince me that I believe that there is a</p> <p>4 hazard. But you refine it from there.</p> <p>5 That's exactly right.</p> <p>6 So there are cases, however,</p> <p>7 where I'm asked to work on a project where</p> <p>8 there is no review or regulatory authority or</p> <p>9 any kind of assessment over a period of</p> <p>10 years, and in those cases there are times</p> <p>11 when I start working on a project and I stop</p> <p>12 and say, "I can't do this." Because that</p> <p>13 happens, yes.</p> <p>14 So opinions do change sometimes</p> <p>15 based on review of additional information.</p> <p>16 Q. Is there any documentation that</p> <p>17 you've produced either in your report or</p> <p>18 otherwise in the MDL that would allow someone</p> <p>19 reviewing the material to understand the</p> <p>20 order in which you reviewed materials or the</p> <p>21 specific weight that you assign them?</p> <p>22 A. So order of review, no. I</p> <p>23 don't think you would know that other than --</p> <p>24 you will note order of review if you look at</p> <p>25 the differences in the literature cited in my</p>	<p>1 your report that have been criticized by</p> <p>2 others at some point in time, correct?</p> <p>3 A. Yes, that's true.</p> <p>4 Q. Okay. Now, in some instances</p> <p>5 you state that you then give little weight to</p> <p>6 those studies, correct?</p> <p>7 A. Yes.</p> <p>8 Q. But in other instances you find</p> <p>9 the criticized study to be helpful and</p> <p>10 informative, correct?</p> <p>11 A. That's true. Because, again,</p> <p>12 judgment -- as anybody does weight of the</p> <p>13 evidence, different scientists can have</p> <p>14 different judgment.</p> <p>15 Mainly, I think, when I look at</p> <p>16 the differences in that -- in that regard, I</p> <p>17 think you should pay attention to what the</p> <p>18 person is. So as a toxicologist, I may view</p> <p>19 a certain type of -- piece of data very</p> <p>20 differently than an epidemiologist may view</p> <p>21 it, as far as the reliability or the</p> <p>22 relevance, because we're coming at it from a</p> <p>23 different training and experience and</p> <p>24 judgment -- set of judgment on what is</p> <p>25 important to a toxicologist when I'm talking</p>
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<p>1 original report versus in the MDL.</p> <p>2 So in my original reliance</p> <p>3 list, if there were documents that weren't</p> <p>4 there and they're now here, obviously that</p> <p>5 tells you it was a review.</p> <p>6 On the issue of a -- of the</p> <p>7 weight of the evidence process, the only</p> <p>8 answer I can give you for that is that</p> <p>9 articles that I believe are -- are reliable,</p> <p>10 are relevant and are -- those are kind of</p> <p>11 the -- you look at the reliability of the</p> <p>12 studies, whether they're peer-reviewed or not</p> <p>13 or if they have proper controls put into</p> <p>14 place, things like that, whether or not</p> <p>15 the -- they're relevant to the question at</p> <p>16 hand. That you can get from looking at how I</p> <p>17 discuss them in the document. But certainly</p> <p>18 there's no, like, summary of that.</p> <p>19 But certainly -- I think you</p> <p>20 understand -- you should understand when you</p> <p>21 read my report what weight I'm giving based</p> <p>22 on how I'm describing those -- those</p> <p>23 materials. I mean, it's --</p> <p>24 Q. Well, for example, you do have</p> <p>25 different studies that you've identified in</p>	<p>1 about risk versus how an epidemiologist might</p> <p>2 talk about risk.</p> <p>3 Q. Could two different</p> <p>4 toxicologists review the same piece of</p> <p>5 literature and give it very different weight?</p> <p>6 A. I don't know about different</p> <p>7 weight, but they certainly -- I know people</p> <p>8 come to different conclusions based on their</p> <p>9 overall assessments. That happens,</p> <p>10 definitely. I mean, there are always going</p> <p>11 to be individuals that look at things</p> <p>12 differently.</p> <p>13 I know in this case there are</p> <p>14 people -- I've seen defense experts that</p> <p>15 reports in -- not in the MDL but in other</p> <p>16 cases, where people disagree with some of my</p> <p>17 opinions, and I disagree with their opinions.</p> <p>18 That happens.</p> <p>19 Q. Okay. And so if I were --</p> <p>20 well, let me just ask something. You have</p> <p>21 not provided any sort of quantitative</p> <p>22 assessment of the weight that you gave</p> <p>23 different pieces of evidence that you cite in</p> <p>24 forming your opinions in the MDL, correct?</p> <p>25 MS. PARFITT: Objection.</p>

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<p>1 Misstates her testimony.</p> <p>2 MR. MEADOWS: Objection.</p> <p>3 THE WITNESS: So I don't report</p> <p>4 for you a table where I quantify that,</p> <p>5 that is correct, but certainly that</p> <p>6 is -- because, again, based upon</p> <p>7 looking at the way that I was trained</p> <p>8 and the documents that I'm talking --</p> <p>9 I'm pointing you to to describe how to</p> <p>10 do weight of the evidence, it is</p> <p>11 not -- it is not a numerical exercise,</p> <p>12 how many here, how many there, this</p> <p>13 one gets 5 points because of this or</p> <p>14 6 points because of this.</p> <p>15 It's more an issue, again, of</p> <p>16 judgment. It's the idea of looking</p> <p>17 across all of the available</p> <p>18 information and determining whether or</p> <p>19 not, based on that, it's your opinion</p> <p>20 that there -- that, for example,</p> <p>21 talc -- talc's toxicity profile</p> <p>22 includes cancer. That's one of the</p> <p>23 judgments -- weight of the evidence</p> <p>24 judgments you make, for example.</p> <p>25</p>	<p>1 you're looking at.</p> <p>2 The robustness of the data.</p> <p>3 For example, the NTP GLP quality</p> <p>4 animal study, very high quality in the</p> <p>5 weight of the evidence. And I talked</p> <p>6 to you about that. In fact, it --</p> <p>7 even though people criticize that</p> <p>8 study, that study is very valuable for</p> <p>9 looking at biologic changes that are</p> <p>10 consistent with a carcinogenic</p> <p>11 mechanism being initiated.</p> <p>12 So even though you may say that</p> <p>13 you can't quantify risk from that</p> <p>14 animal study as far as calculating a</p> <p>15 cancer potency factor, what you can do</p> <p>16 is use that study of high quality to</p> <p>17 make judgments within a weight of the</p> <p>18 evidence for risk.</p> <p>19 QUESTIONS BY MS. BRANSCOME:</p> <p>20 Q. Dr. Plunkett, you understand I</p> <p>21 have seven hours today, and I -- while I'm</p> <p>22 very interested in the answers that you give,</p> <p>23 if we could just -- we will get to things</p> <p>24 like NTP when we get there, if you could just</p> <p>25 attempt to answer the question that I've</p>
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<p>1 QUESTIONS BY MS. BRANSCOME:</p> <p>2 Q. So -- but, Dr. Plunkett, just</p> <p>3 to be clear, you do not provide a numerical</p> <p>4 value to the particular pieces of evidence</p> <p>5 that you have considered as part of your</p> <p>6 weight of the evidence assessment in the MDL,</p> <p>7 correct?</p> <p>8 MS. PARFITT: Objection. Form.</p> <p>9 THE WITNESS: So I do not</p> <p>10 provide a numerical value as you see</p> <p>11 it laid out, for example, in the</p> <p>12 Canadian table, but certainly I do</p> <p>13 judge articles that I include in my</p> <p>14 weight of the evidence based on a</p> <p>15 system that includes different</p> <p>16 considerations such as -- like I said,</p> <p>17 peer-reviewed or not, that makes an</p> <p>18 issue.</p> <p>19 Whether or not the study that's</p> <p>20 being reported is the only one -- the</p> <p>21 first or is this something that is --</p> <p>22 that is describing an assessment</p> <p>23 that's been done by someone else and</p> <p>24 so you see a repetition or a</p> <p>25 consistency among the studies that</p>	<p>1 asked.</p> <p>2 I simply asked the question:</p> <p>3 Are there numerical values assigned to the</p> <p>4 particular pieces of evidence that you have</p> <p>5 considered as part of your weight of the</p> <p>6 evidence assessment in reaching your opinions</p> <p>7 in the MDL; yes or no?</p> <p>8 A. And I said to you, not in the</p> <p>9 way that it's done -- I assume you're</p> <p>10 referring to something like what was done --</p> <p>11 what's in the Canadian epidemiology table. I</p> <p>12 have not done that, no.</p> <p>13 Q. Okay.</p> <p>14 A. That's exactly right.</p> <p>15 Q. Have you provided a qualitative</p> <p>16 chart, for example, of the evidence that you</p> <p>17 have considered in forming your opinions in</p> <p>18 the MDL?</p> <p>19 MS. PARFITT: Objection. Form.</p> <p>20 THE WITNESS: I don't know what</p> <p>21 you mean by qualitative chart. I</p> <p>22 certainly have -- I certainly, I</p> <p>23 believe, have given you qualitative</p> <p>24 descriptions of my weight within my</p> <p>25 discussions of each study, yes, I have</p>

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<p>1 done that.</p> <p>2 QUESTIONS BY MS. BRANSCOME:</p> <p>3 Q. You mention in response to the</p> <p>4 prior question that you have a system for</p> <p>5 weighting the pieces of evidence that you</p> <p>6 have reviewed.</p> <p>7 Can you point me to paragraphs</p> <p>8 in your report marked Exhibit 4 that would</p> <p>9 outline in detail the system that you used to</p> <p>10 apply different weight analysis to different</p> <p>11 pieces of evidence?</p> <p>12 MS. PARFITT: Objection. Form.</p> <p>13 THE WITNESS: And I think I</p> <p>14 answered that, that there's no system</p> <p>15 written down by anyone. But what</p> <p>16 there is, instead, is if you read</p> <p>17 these -- if you read these</p> <p>18 descriptions of use of weight of the</p> <p>19 evidence that I've cited in</p> <p>20 paragraph 13 as well as the discussion</p> <p>21 of methodology in the Canadian</p> <p>22 document, that is consistent with what</p> <p>23 I do. It's the idea that you start</p> <p>24 with a literature search for</p> <p>25 peer-reviewed, publicly available</p>	<p>1 published afterwards, and what I</p> <p>2 thought I said to you was that if you</p> <p>3 look at that document -- it's not in</p> <p>4 paragraph 13, but if you look at that</p> <p>5 document, it lays out a process. And</p> <p>6 I wouldn't call it a system. It's a</p> <p>7 process. It's a process by which you</p> <p>8 screen information for relevance to</p> <p>9 the question being asked and how,</p> <p>10 then, based on that, you look at</p> <p>11 characteristics of that information</p> <p>12 such as -- and I tried to give you</p> <p>13 some of those.</p> <p>14 And I've said this before in</p> <p>15 depositions in these cases. You know,</p> <p>16 you look at the issue of whether or</p> <p>17 not the study was peer-reviewed,</p> <p>18 whether or not there was</p> <p>19 statistically -- statistical</p> <p>20 significance or at least statistics</p> <p>21 applied to the data. What was the</p> <p>22 quality of the study as far as the</p> <p>23 size in order to be able to answer the</p> <p>24 question being asked. Those are the</p> <p>25 kinds of things that you look at.</p>
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<p>1 information. You look at the quality</p> <p>2 of the studies, the statistically</p> <p>3 significant findings. Those are all</p> <p>4 things that are discussed within these</p> <p>5 documents I'm pointing you to.</p> <p>6 QUESTIONS BY MS. BRANSCOME:</p> <p>7 Q. Now, you --</p> <p>8 A. But it's -- it's -- I don't</p> <p>9 know of anyone who has written down a</p> <p>10 specific system that applies in all</p> <p>11 circumstances, no.</p> <p>12 Q. Okay. Have you written down a</p> <p>13 system that applies specifically in this</p> <p>14 case?</p> <p>15 A. I think I have tried to do that</p> <p>16 for you when I describe what I did.</p> <p>17 Q. Okay. You just referenced the</p> <p>18 fact that your system can be found in the</p> <p>19 Canadian document.</p> <p>20 You agree that the Canadian</p> <p>21 analysis was actually published or produced</p> <p>22 after you had completed your report in the</p> <p>23 MDL, correct?</p> <p>24 MS. PARFITT: Objection. Form.</p> <p>25 THE WITNESS: Certainly it was</p>	<p>1 And then also the question --</p> <p>2 when you're looking at a specific</p> <p>3 question, you may pull in -- like you</p> <p>4 asked me about the starch particle.</p> <p>5 You may pull in things that you give</p> <p>6 less weight because obviously that's</p> <p>7 not just talc, that's starch, and you</p> <p>8 have to consider that. So that is</p> <p>9 part of the process.</p> <p>10 QUESTIONS BY MS. BRANSCOME:</p> <p>11 Q. Dr. Plunkett, the question I</p> <p>12 asked you simply was: The paper that you</p> <p>13 reference that contains some detail about the</p> <p>14 Canadian analysis, that was published after</p> <p>15 you completed your report that's marked here</p> <p>16 as Exhibit 4; is that correct?</p> <p>17 MR. MEADOWS: Objection.</p> <p>18 THE WITNESS: Yes, and I</p> <p>19 believe I answered that at the start.</p> <p>20 I usually try to answer your question,</p> <p>21 and then I try to explain further some</p> <p>22 details I think are important context</p> <p>23 on my answer.</p> <p>24 QUESTIONS BY MS. BRANSCOME:</p> <p>25 Q. I understand that,</p>

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<p>1 Dr. Plunkett. You have given many 2 depositions. You understand I can ask you 3 for more detail if that would be helpful to 4 me. 5 If you could, just focus on the 6 question that I asked, and we can explore 7 additional areas if that's something I'm 8 interested in doing. 9 Okay? 10 MR. MEADOWS: Objection. 11 She's -- 12 MS. BOCKUS: Break? 13 MR. MEADOWS: After I finish my 14 objection. 15 She's going to answer the 16 question as thoroughly as she feels 17 like she needs to answer the question 18 based on the way you ask it. 19 Want to take a break now? 20 MS. BRANSCOME: We can go off 21 the record. 22 VIDEOGRAPHER: We're going off 23 the record at 10:41 a.m. 24 (Off the record at 10:41 a.m.) 25 VIDEOGRAPHER: We are back on</p>	<p>1 panel; is that correct? 2 A. Yes. 3 Q. And so is it your view that a 4 study or an analysis that reaches a 5 particular conclusion should be assigned 6 little weight if it fails to consider all 7 relevant scientific evidence to the issue 8 that it's evaluating? 9 MS. PARFITT: Objection. 10 THE WITNESS: I think it 11 depends on the situation, but that 12 could be the case, yes. It depends 13 on -- on the -- depends on -- I think 14 it would depend on each case, the 15 question being asked, and what was 16 omitted. But, yes, I think it could. 17 QUESTIONS BY MS. BRANSCOME: 18 Q. Okay. And in this situation 19 you identify -- I believe you claimed that 20 eight human studies were not considered by 21 the CIR 2013 panel; is that correct? 22 A. Let me look at the number, but 23 that sounds about right. Yes. 24 Q. All right. And returning, 25 actually, to your prior answer, you said that</p>
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<p>1 the record at 10:56 a.m. 2 QUESTIONS BY MS. BRANSCOME: 3 Q. All right. Dr. Plunkett, we 4 started talking a little bit about the CIR 5 analysis that was done in 2013. 6 Am I correct you no longer 7 consider that reliable? Is that your 8 opinion? 9 A. Yes. 10 Q. Okay. And you identify in your 11 report marked as Exhibit 4, I believe it's 12 paragraph 56? 13 A. Yes, that's correct. And I 14 think I talked about it later on as well, but 15 definitely I do here. 16 Q. Okay. And in paragraph 56, you 17 state that the CIR panel failed to account 18 for all the studies that informed on the 19 issue of migration of particles such as talc 20 upwards through the reproductive tract. 21 Is that your opinion? 22 A. Yes. 23 Q. Okay. And then you state that 24 because of that you assign, quote, little 25 weight to the conclusions reached by the CIR</p>	<p>1 the failure to consider all relevant 2 scientific evidence on a topic would lead you 3 to assign little weight to a particular 4 conclusion. You said that that could happen. 5 Under what circumstances would 6 you assign a conclusion little weight for 7 failing to consider what you consider to be 8 all relevant pieces of scientific literature? 9 A. Well, I think it depends -- 10 well, the reason I specifically addressed 11 that in this case is because that was -- the 12 conclusions about migration is the main 13 reason why the CIR panel then draws 14 additional conclusions later on. 15 So my issue is, migration was 16 key to what -- the decisions they made about 17 the safety issues of talc. And so in that 18 particular case, this -- this failure to 19 consider all the evidence was extremely 20 important, in my view, and I gave it little 21 weight. 22 There might be a situation 23 where some -- for example, you may only look 24 at six or eight studies, even though there 25 may be dozens out there. You may have a</p>

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<p>1 reason for why you only looked at six or 2 eight, or it may be -- and as a result you 3 may lay that out and, therefore, you may 4 still give weight to conclusions drawn. Or 5 it may be that the six or eight are -- 6 studies that you discuss are not -- the 7 weight is not affected by what you've 8 omitted.</p> <p>9 I believe that the weight is 10 affected by what is omitted when you look at 11 some of the articles being review articles, 12 which give you an understanding of what was 13 generally accepted within the scientific 14 community when you get to reviews, those 15 kinds of things. So it really is a 16 case-by-case basis.</p> <p>17 But certainly I do believe that 18 it is possible that in another circumstance 19 where things are omitted you would come to 20 the same conclusion, that you give those 21 conclusions less weight.</p> <p>22 Q. Is there a way, if someone were 23 try to replicate the weighting of particular 24 evidence based upon your process, for them to 25 know whether or not the omission of a</p>	<p>1 QUESTIONS BY MS. BRANSCOME: 2 Q. Okay. Of the eight studies 3 that you identify on page 37 of your report 4 that you contend the CIR panel did not 5 account for, do any of those eight studies 6 specifically discuss the migration of talc in 7 human subjects? 8 A. No, I don't believe they do, 9 but there are a couple of these studies that 10 I found to be extremely important if you want 11 me to explain that to you. 12 Q. Do you break out in your report 13 in any other paragraphs which of these eight 14 articles you consider to be extremely 15 important? 16 And if you could just point me 17 to paragraph numbers, that's good enough if 18 you have, in fact, broken them out. 19 A. I have. I -- this whole 20 section I break -- I talk about each one 21 individually. So I think you can tell by 22 what I read -- what I'm discussing what I 23 thought was important and informative about 24 each of those. 25 Q. Do you rank the eight studies</p>
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<p>1 citation of certain studies means that a 2 study should be given little weight or 3 whether it wouldn't affect the weighting of 4 that scientific article?</p> <p>5 MS. PARFITT: Objection. Form. 6 THE WITNESS: So I think this 7 is the issue of judgment, training and 8 experiencing that is applied to all 9 such assessments, and this is why 10 different scientists may come to 11 different conclusions. But certainly 12 it is -- it was important to my 13 assessment on this issue because of 14 the prominent role that the CIR report 15 gives to their conclusions here for 16 why they then drew conclusions about 17 safety. And so that link was 18 extremely important.</p> <p>19 MS. BRANSCOME: Can we pause 20 for just a moment? 21 VIDEOGRAPHER: We are going off 22 the record at 11:00 a.m. 23 (Off the record at 11:00 a.m.) 24 VIDEOGRAPHER: We are back on 25 the record at 11:01 a.m.</p>	<p>1 in any way by their importance to you? 2 A. Not with any numerical rank, 3 no, but certainly I think I do that for you 4 when I talk about the studies. I give you an 5 understanding of ones that I think are 6 particularly informative and ones that are 7 not.</p> <p>8 So, for example, I weight the 9 human data -- I think I tell you that -- more 10 than the animal data because of the 11 differences between the reproductive tracts 12 of humans versus animals generally, upright 13 versus -- upright and habits and things that 14 humans do that relate to insertions in and 15 out of the reproductive tract, I guess is a 16 nice way to describe it, versus an animal, 17 that those can have, and then also the 18 differences between animals and humans in 19 terms of bursal sac around the ovary, those 20 kinds of things.</p> <p>21 So I do -- that -- I guess that 22 ranking I do give you here. I tell you that 23 I think these -- I think that the most 24 relevant are going to be the human studies 25 versus the animal studies.</p>

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<p>1 Q. Right.</p> <p>2 So my question specifically is,</p> <p>3 where would you point me to in your report to</p> <p>4 understand the weight that you gave each of</p> <p>5 these particular eight studies?</p> <p>6 A. At my descriptions of those</p> <p>7 studies and what I describe. That's all I</p> <p>8 can tell you.</p> <p>9 Q. And I'm just asking,</p> <p>10 Dr. Plunkett, can you point me in the report</p> <p>11 to where that discussion takes place?</p> <p>12 A. It takes place -- I have a</p> <p>13 discussion for each study, and I would -- and</p> <p>14 if you read what I say about each study, I</p> <p>15 try to go through what the strengths and</p> <p>16 weaknesses of those studies are.</p> <p>17 And so those -- that would be,</p> <p>18 let's see -- you want me to give you the</p> <p>19 starting paragraph?</p> <p>20 Q. So, for example, Parmley and</p> <p>21 Woodruff. Can you point me to where in your</p> <p>22 report you discuss Parmley and Woodruff, such</p> <p>23 that I can understand the weight that you</p> <p>24 gave that particular study?</p> <p>25 A. So the year of it is...</p>	<p>1 So what I do is, when I'm</p> <p>2 discussing about these -- all of these papers</p> <p>3 here contribute to my weight of the evidence.</p> <p>4 And if it's a human study, I'm giving those</p> <p>5 more weight than I'm giving animal studies.</p> <p>6 And that's described.</p> <p>7 And then within papers I'm</p> <p>8 pulling out information that contributes to</p> <p>9 what I think is important about what the</p> <p>10 study says, and that -- and the importance of</p> <p>11 what is described within the study</p> <p>12 contributes to my weight.</p> <p>13 And I don't know how else to</p> <p>14 describe it to you. That is the process that</p> <p>15 scientists go through when they evaluate</p> <p>16 data.</p> <p>17 Q. And so my question to you:</p> <p>18 Earlier you said of these eight studies, some</p> <p>19 of them were particularly important to you.</p> <p>20 How would I, using only what's</p> <p>21 written in your report, understand which of</p> <p>22 those eight studies was of particular</p> <p>23 importance to you?</p> <p>24 A. So it would have to do with</p> <p>25 what I discuss about the study. So I'm</p>
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<p>1 So I think I discuss it in</p> <p>2 paragraph 44, and so I describe for you what</p> <p>3 important information is in there, which is</p> <p>4 the information that I take as forming part</p> <p>5 of my weight of the evidence.</p> <p>6 So one of the most important</p> <p>7 things is what -- they have a figure they</p> <p>8 show, and they're showing -- which is one of</p> <p>9 the unique figures in all of the published</p> <p>10 literature. But it talks about the</p> <p>11 differences between the female reproductive</p> <p>12 tract and the male reproductive tract, and it</p> <p>13 shows the actual -- it talks about a</p> <p>14 discussion of movement from substance in the</p> <p>15 environment through -- into the vagina, into</p> <p>16 the fallopian tubes. So it's a paper that</p> <p>17 addresses that very specific issue.</p> <p>18 Q. So my question to you, though,</p> <p>19 is, where do you have a discussion of the</p> <p>20 weight that you give to these particular</p> <p>21 articles?</p> <p>22 A. So the discussion of the weight</p> <p>23 has to do with the information described. I</p> <p>24 don't give them a numerical ranking. I told</p> <p>25 you that.</p>	<p>1 telling you, when I -- if you look through</p> <p>2 this entire section, this is the Parmley and</p> <p>3 Woodruff paper. It is important because it</p> <p>4 addresses the specific issue of movement of</p> <p>5 environmental substances from the outside to</p> <p>6 the inside. So I'm giving that importance in</p> <p>7 my evaluation because of what that author is</p> <p>8 actually discussing.</p> <p>9 I don't know how else to</p> <p>10 describe that. I apologize. I mean, to me,</p> <p>11 weight of the evidence is a process that</p> <p>12 scientists use bringing their training and</p> <p>13 experience and judgment, and it's not a</p> <p>14 numerical process across the board, it just</p> <p>15 is not, based on the way weight of the</p> <p>16 evidence is used within science.</p> <p>17 Q. Now, Dr. Plunkett, though, you</p> <p>18 would acknowledge that if you wanted to</p> <p>19 assign numerical values to the studies, that</p> <p>20 has been something that has been done by</p> <p>21 other authors and other authors on whom you</p> <p>22 rely, correct?</p> <p>23 MS. PARFITT: Objection. Form.</p> <p>24 THE WITNESS: I don't believe</p> <p>25 that's true. I'll need to look -- I</p>

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<p>1 don't believe that's true with respect 2 to the biological information. I 3 believe it may be true with respect to 4 the epidemiology studies. 5 You want me to look real quick 6 to confirm that? I can do that really 7 quick, but... 8 QUESTIONS BY MS. BRANSCOME: 9 Q. I'm simply saying, could you 10 assign a numerical value if you chose to do 11 so? 12 MR. MEADOWS: Objection. 13 Objection. Form. 14 THE WITNESS: And I'm -- what 15 I'm trying to say to you is I think 16 that I -- that there is no one set of 17 rules that you would assign in order 18 to do that for all the types of 19 studies that you weigh. 20 I would agree that I have seen 21 it routinely done -- well, not 22 routinely, but I've seen it done 23 within the epidemiological community 24 when they go through the epi data. 25 But not -- it's not something that</p>	<p>1 Q. All right. And you are aware 2 that there is, in fact -- called PDQs, 3 correct? 4 A. That's the abbreviation, yes. 5 Q. Right. And you're aware that 6 the National Cancer Institute has in fact 7 published a PDQ that addresses a potential 8 connection between talc and ovarian cancer, 9 correct? 10 A. I'm aware of several that have 11 been done over the years, but, yes, I'm aware 12 of that. 13 Q. And have you reviewed those? 14 A. Yes, I have. 15 Q. Are they listed on your 16 reliance list? 17 A. No, but they're listed within 18 the materials as discussed within my 19 depositions, and I thought -- and my 20 testimony. I thought that was part of my 21 reliance list. I believe that it -- it was 22 in my reliance list, is encompassing all of 23 the testimony as well as the actual 24 documents. Maybe I'm mistaken, but that was 25 my understanding.</p>
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<p>1 I've seen done when you talk about 2 weight of the evidence as part of a 3 human health risk assessment. That is 4 not something that scientists 5 typically do as far as giving 6 numerical rankings. 7 QUESTIONS BY MS. BRANSCOME: 8 Q. You're familiar with the 9 National Cancer Institute, correct? 10 A. Yes, I am. 11 Q. All right. They are considered 12 to be the nation's leader in cancer research, 13 correct? 14 MS. PARFITT: Objection to 15 form. 16 THE WITNESS: The National 17 Cancer Institute? 18 Yes, they are. I don't know if 19 they're "the" leading, but they're one 20 of the leading, that's true. 21 QUESTIONS BY MS. BRANSCOME: 22 Q. Okay. And you're familiar with 23 publications that they issue called physician 24 data queries? 25 A. Yes, I am.</p>	<p>1 Q. Okay. If they are not on your 2 reliance list, should they be? 3 A. I believe that they are on my 4 reliance list by it having been pointed to as 5 part of the testimony that I have given and 6 the documents that I have relied upon during 7 testimony. 8 Q. Okay. And you are aware that 9 they have issued a PDQ that -- on the website 10 as of today, correct? 11 A. I haven't looked today, so I'm 12 sure -- but I know that -- I don't believe it 13 has been removed, so I believe that there is 14 something there, yes. 15 Q. All right. And what is your 16 understanding of the position stated in the 17 PDQ with respect to a possible link between 18 talc and ovarian cancer? 19 A. So I'd have to look at the one 20 today to tell you what it says, but it's 21 evolved over time and it's changed over time, 22 and I have specific opinions that I've 23 expressed at trial about that issue. 24 Do you want me to go into that 25 details or I mean --</p>

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<p>1 Q. I'm not asking about your 2 opinions about what their position is. I'm 3 simply asking you, Dr. Plunkett, the most 4 recent NCI PDQ that you have reviewed, what 5 is the position that the National Cancer 6 Institute has taken with respect to the 7 relationship between talc and ovarian cancer? 8 A. So I would want to pull it out 9 to give you the specific statement of their 10 position, but their position has changed such 11 that later in time they've weakened the 12 link -- their statements about the link 13 between ovarian cancer and genital talc use. 14 So it used to be seen as a 15 cause, and now I believe it's not seen as a 16 cause. I don't know the exact language, 17 though. I'd have to look at it as -- maybe 18 risk factor is the better word to use. 19 And I need to look at the most 20 recent one. And that would be the best way. 21 Let's just see what it says. 22 Q. Okay. 'Cause is it your 23 position as you sit here today that the 24 National Cancer Institute has ever issued a 25 statement that talc causes ovarian cancer?</p>	<p>1 any -- whatever portion of this is helpful to 2 you. 3 And then if you could answer my 4 question, Dr. Plunkett, of what is the 5 position as stated in Deposition Exhibit 6 Number 7 of the National Cancer Institute 7 with respect to the relationship between talc 8 and ovarian cancer? 9 A. So I would be looking at the 10 section on page 12 of 18, and maybe you're 11 looking somewhere else, but that's where they 12 actually talk about perineal talc exposure. 13 And it's under the section where they have 14 now moved into factors with an adequate 15 evidence of an association and they describe 16 it here. So they're calling it an 17 association where the weight of the evidence 18 is not adequate to support that association. 19 Q. All right. And so the first 20 sentence of the section under perineal talc 21 exposure states, "The weight of the evidence 22 does not support an association between 23 perineal talc exposure and an increased risk 24 of ovarian cancer." 25 Did I read that correctly?</p>
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<p>1 A. I believe it was listed as a 2 risk factor for ovarian cancer in the older 3 PDQs. 4 (Plunkett Exhibit 7 marked for 5 identification.) 6 QUESTIONS BY MS. BRANSCOME: 7 Q. I do have a copy here. Just 8 for the sake of the record, we will mark this 9 as Plunkett Deposition Exhibit Number 7. 10 Handing a copy to you, 11 Dr. Plunkett, do you recognize the document 12 that I just handed you that's marked as 13 Exhibit 7? 14 MR. LOCKE: What's the date of 15 that? 16 MS. BRANSCOME: This was 17 printed on December 14, 2018. 18 THE WITNESS: It's -- the 19 updated date is June 22, 2018, if that 20 helps. 21 MR. LOCKE: Yes, thank you. 22 THE WITNESS: I have seen this 23 one, yes. 24 QUESTIONS BY MS. BRANSCOME: 25 Q. All right. And you can review</p>	<p>1 A. You did read that correctly. 2 Q. All right. And it indicates 3 that "results from case-control and cohort 4 studies are inconsistent." 5 Did I read that correctly, 6 Dr. Plunkett? 7 A. You did. 8 Q. And the question that I would 9 ask simply is, do you discuss the National 10 Cancer Institute PDQ in the report that 11 you've issued in the MDL, which is identified 12 as Exhibit 4? 13 A. I don't specifically discuss 14 this document, no, I do not. 15 Q. Okay. And you understand that 16 the NCI PDQ did a weight of the evidence 17 analysis that followed a formal evidence 18 ranking system, correct? 19 MS. PARFITT: Objection. 20 THE WITNESS: So I -- it's not 21 laid out here, but they do have a 22 process they use. 23 Is that what you're asking me? 24 QUESTIONS BY MS. BRANSCOME: 25 Q. Yes.</p>

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<p>1 A. Yes. And again, they're 2 ranking the epidemiological data, and so I 3 understand that that is there, yes. 4 Q. Now, you've said a few times 5 that you could qualitative -- you could give 6 a quantitative weight to an epidemiological 7 study, somehow suggesting that it is 8 different from other types of studies. 9 What is it about a 10 toxicological study, for example, that would 11 prevent someone from giving a quantitative 12 weight in a weight of the evidence analysis? 13 A. Because it is just what is 14 typically done and not done. There are 15 certain practices within the community, what 16 is kind of -- I would say that scientists use 17 routinely, or scientists have used. Not all 18 scientists give numerical rankings to 19 epidemiological data either, because even 20 within a Bradford Hill assessment, when you 21 use the considerations, there's no 22 requirement for ranking studies in order to 23 meet the requirements of use of that 24 methodology. 25 Q. Okay.</p>	<p>1 of epidemiological evidence? 2 A. If by -- you mean prevent, was 3 someone stopping me from doing that, no. But 4 if you ask what would be standard practice 5 based on my experience, I would not be doing 6 that. 7 Q. Has anyone -- and I'm not 8 referring in this case to any attorneys. But 9 has anyone reviewed your -- the weighting 10 that you gave specific pieces of evidence as 11 essentially a form of a peer review process? 12 A. If by that you mean have I 13 submitted my opinions for publication, no, I 14 have not done that. Part of -- that's partly 15 driven by my understanding of the evidence 16 that I reviewed, that some of it may not be 17 something that I should be discussing 18 necessarily in a public form outside of the 19 cases I'm working in. 20 But certainly I have not 21 submitted it for publication, if that's what 22 you mean. No, I have not done that. 23 Q. Okay. Has the methodology that 24 you have used in the MDL, has that been -- 25 have you submitted any type of analysis using</p>
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<p>1 A. But I have seen it done in the 2 epidemiology community, and that is the most 3 common place I see it. I do not see other 4 toxicologists that are assessing animal 5 studies and in vitro studies doing it that 6 same way. 7 When you do a human health risk 8 assessment, that isn't routine practice to do 9 numerical rankings on studies. 10 Q. Okay. 11 A. At least in my experience and 12 in my training, and I was trained in the use 13 of risk assessment by one of the individuals 14 who actually invented the process. 15 Q. Okay. Okay. But do you 16 consider the epidemiological evidence as part 17 of your risk assessment in the MDL? 18 A. I do, because I'm looking at it 19 in the context of what is out there and 20 what's available. I don't always have human 21 data when I do risk assessments, but in this 22 one I do. So I do consider them, yes. 23 Q. Okay. Did anything prevent you 24 from doing a quantitative assessment of the 25 weight that you were giving different pieces</p>	<p>1 that methodology for publication even outside 2 of particularly looking at Johnson's baby 3 powder, for example? 4 A. Yes, in -- if you look at my 5 publications that describe risk assessments 6 that I have done. So the one that would come 7 to -- to play that's similar as far as the 8 scope of the weight of the evidence would -- 9 at least with the animal and the in vitro 10 studies, would be the paper that I published 11 on copper, looking at the database of copper 12 and identifying points of departure and 13 target organs and risk -- risk issues based 14 on copper use in humans, trying to set a -- 15 understand what a safe exposure level could 16 be to copper in water. And that was 17 published -- that actually was one of the 18 papers that's published with Dr. Krewski, who 19 is one of the authors of this risk assessment 20 in Canada. 21 Q. And is it your position that 22 you follow the same methodology in what 23 you've reported in the MDL with respect to 24 Johnson's baby powder that you did in your 25 analysis of copper?</p>

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<p>1 A. Yes, with the process of going 2 through all of the publicly available 3 information, putting it together based on its 4 relevancy and reliability. 5 We did a process where we 6 grouped it based on animal versus human, just 7 like I've done here. And we call it the 8 bins, but it's the same idea. I have a bin 9 of human data, I have a bin of animal data 10 and a bin of in vitro data. And so, yes, the 11 process was very, very similar. 12 Q. Okay. Returning back to some 13 documents that you chose not to cite in your 14 report, you do not discuss the Gonzales 2016 15 study in your report for the MDL, correct? 16 MS. PARFITT: Objection. Form. 17 THE WITNESS: I'll have to 18 look. It is not cited in the 19 reference list to my report, that is 20 true. So that means it would not be 21 mentioned specifically in the body of 22 the report. 23 QUESTIONS BY MS. BRANSCOME: 24 Q. You're familiar with the 25 Gonzalez 2016 study, correct?</p>	<p>1 include something like the Gonzales 2016 2 study, but yet you will disagree the 3 2013 -- the CIR 2013, you will give it little 4 weight for not discussing particular studies? 5 A. So that's a very different 6 exercise. You want me to explain my thinking 7 on that? I can do that for you, but I 8 believe that's apples and oranges question. 9 My reasons for giving little 10 weight to the CIR overall assessment versus 11 my weight or the assessment I make of an 12 individual piece of data, that's different. 13 And that's what you're describing for me. 14 And I believe Gonzales is in my 15 overall reliance list, so I have read 16 Gonzales. It is something that I have 17 considered; it's not something that I've 18 cited in my paragraphs. So it doesn't mean 19 it didn't go into my weight of the evidence, 20 because I do have it and I have reviewed it. 21 I just don't recall the details on it. 22 Q. Is it your position as you sit 23 here today that you know for sure that the 24 CIR panel did not -- was not aware of or even 25 considered any of the eight studies that you</p>
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<p>1 A. If you want me to talk about 2 it, you'd have to pull it out for me, but I 3 know the name, yes. 4 Q. Okay. And it was looking at an 5 association between the perineal use of talc 6 and ovarian cancer, correct? 7 A. That, I'd have to look at it to 8 tell you. I believe it was a human study 9 that would be consistent with that, but I 10 need to pull it out to look at it. 11 Q. All right. Do you, as you sit 12 here today, do you know why you did not 13 discuss it in your report? 14 A. I wasn't doing a full causation 15 analysis in this report, so as a result I'm 16 not trying to characterize every piece of 17 human data. But I certainly am looking at 18 the consistency across the studies, and 19 that's what I've done. 20 And I mention it here. I do 21 think I mention here that there are studies 22 that came to different conclusions than the 23 ones that I'm specifically describing. 24 Q. Okay. And so why is it that -- 25 why is it acceptable for you to choose not to</p>	<p>1 contend the omission of which makes it of 2 little weight? 3 MS. PARFITT: Objection. Form. 4 THE WITNESS: I would say I'm 5 99.9 percent sure, based on the 6 process that is -- that goes in. And 7 if you want me to explain, I'll tell 8 you why I feel that level of surety. 9 You know, I can always say that 10 maybe there was someone that came to 11 the panel that did a search on their 12 own, but that is not what's done. The 13 individuals that come to the panel are 14 given a body of information provided 15 to them in written form that they 16 review. So it's not like they -- they 17 have access to anything that isn't 18 cited in the actual report. 19 QUESTIONS BY MS. BRANSCOME: 20 Q. Okay. The eight articles that 21 you discuss that are not mentioned in the CIR 22 panel's work, they are publicly available 23 pieces of scientific literature, correct? 24 A. Yes, which was why it's 25 interesting to me that those were not grabbed</p>

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<p>1 and included within -- within the assessment 2 done by the -- by the PCPC's group that 3 handles CIR -- handled the CIR process here. 4 Q. Okay. We received just before 5 your deposition, a few days in advance, a 6 list of materials that have been added to 7 your reliance list since you produced your 8 report in this case. 9 Did you provide that list of 10 materials to counsel to -- are you aware of 11 the materials that were identified? 12 A. Yes, I am. They're ones that I 13 have reviewed since my report and -- yes, 14 which would have been, I believed, important 15 for you to know about, because obviously you 16 wouldn't know if I hadn't provided that to 17 you, and fair game for you to ask me about. 18 Q. On that list was contained a 19 number of news articles. 20 A. Uh-huh. 21 Q. Are news articles pieces of 22 scientific information that you typically 23 consider in performing a risk assessment? 24 A. No, they're not part of my risk 25 assessment, but they -- but they were</p>	<p>1 section on the role of the industry in 2 Section 7. 3 Q. Okay. So the newspaper 4 articles are not something that you are 5 considering as part of your analysis of 6 whether there is a risk of ovarian cancer 7 from Johnson's baby powder, correct? 8 A. No, that's a separate issue 9 because it's not -- it's not scientific data, 10 per se. 11 Q. Okay. All right. Now, if you 12 could turn to paragraph 31 in your report. 13 Okay. You discuss the 14 biological effects of talc in this paragraph 15 and in others, correct? 16 A. Yes, I would call this my 17 introductory paragraph to transition into a 18 specific topic, yes. 19 Q. Okay. And you talk here about 20 the structure and size of talc affecting its 21 properties. 22 What do you mean by that? 23 A. So whether it's fibrous enough, 24 platy, fibrous. Whether it is particle sizes 25 of less than 10 microns, less than 5 microns,</p>
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<p>1 relevant to -- they were relevant to my 2 overall assessment of the issue of what the 3 company is doing with regard to public 4 dissemination of information. 5 So it's not the risk assessment 6 part. It's more on the issue of the -- when 7 I talk about the different influences of the 8 company on public dissemination of 9 information, I went through the different 10 specific issues. So this would be a specific 11 issue related to a news report that someone 12 comes out with, the Reuters report, and then 13 looking at what the company is saying in 14 addition to that. 15 So it's understanding -- for 16 example, the documents that Reuters 17 discusses, many of those I'm sure I have 18 seen, although I don't have access to -- I 19 wasn't able to go on websites and download 20 everything that they cite. But certainly 21 they looked familiar, some of the ones I did 22 see. 23 So it's that issue of -- the 24 last part of my report, I think. Want me to 25 tell you the section? It would be in the</p>	<p>1 greater than 75 microns. There's 2 different -- certain pieces of literature 3 deal with different size ranges of talc. The 4 smaller the size range, the more toxic it is, 5 for example, to lung tissue; the more likely 6 it is to be able to move, based upon the 7 size, versus being engulfed by a macrophage 8 if it's a larger particle, things like that. 9 Q. So focusing specifically on 10 ovarian cancer, what role does size and 11 structure of a talc particle play with 12 respect to a risk of ovarian cancer in your 13 opinion? 14 A. I don't think I formed a 15 opinion that it has to be a specific size or 16 structure, because the -- my opinions are 17 related to the fact that we have a complex 18 mixture of ingredients within the body 19 powder, and my assessment's been on the 20 overall consumer product, not on any one 21 particular ingredient only within it. 22 So it's the idea of just 23 understanding that size and structure of 24 these particles are general principles that 25 affect toxicology. So a larger particle or a</p>

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<p>1 fibrous particle may have a different tissue 2 toxicity response than a smaller particle. 3 So in other words -- I think I 4 discuss this later in a paragraph about 5 pleurodesis, the idea that you can get acute 6 versus chronic inflammation, or respiratory 7 distress or not. So it's just this idea of a 8 general principle that outlines how you would 9 think about particles generally as a 10 toxicologist. 11 Q. Well, okay. So you said that 12 your assessment is based on the overall 13 consumer product. That would be Johnson's 14 baby powder or SHOWER TO SHOWER®, correct? 15 A. Yes. 16 Q. All right. 17 A. Or Shimmer. I think that's the 18 other name. There's a third product. 19 Q. Okay. But my question to you 20 is, you actually cite a number of pieces of 21 literature in the section about the alleged 22 toxicity of talc that don't relate to the 23 overall consumer products at issue in this 24 case, correct? 25 MS. PARFITT: Objection. Form.</p>	<p>1 known to affect tissue toxicity as far as 2 adverse events like inflammation and/or 3 irritation. 4 Q. Okay. So that's -- that's what 5 I'm trying to understand in more detail. 6 What is your opinion with 7 respect to -- let's take size to start with. 8 Is there a particular size talc particle that 9 is more or less likely to cause inflammation, 10 in your opinion? 11 A. It depends whether you're 12 talking about acute or chronic. I would say 13 for acute inflammation the larger particles, 14 such as some of the particle sizes that are 15 used in the pleurodesis products, are more 16 likely to initiate an acute inflammatory 17 response due to the fact that they're large 18 enough that the body will recognize them with 19 a fairly robust foreign body response. 20 Q. What is your definition of 21 large? 22 A. So the literature varies, but 23 certainly particles that are above -- some of 24 the literature talks about particles that are 25 in the range of 25 to 75. Some of them talk</p>
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<p>1 THE WITNESS: No, I would 2 disagree with that when you use the 3 word "relate." Relate to me means is 4 it relevant to the assessment, and 5 they are, even if they're not just on 6 the finished product. 7 But if what you mean is that 8 there are studies that did not test 9 the consumer product but individual 10 ingredients or -- that is true, yes, 11 but all of that is relevant or relates 12 to the overall risk assessment. 13 QUESTIONS BY MS. BRANSCOME: 14 Q. Okay. So given your view that 15 information about the individual constituents 16 is relevant to evaluating the overall 17 toxicity of the ultimate consumer products, 18 then my question to you is: How does the 19 structure and size of the component talc 20 particles play a role in toxicity with 21 respect to ovarian cancer? 22 A. Just generally -- it's not 23 just -- well, with respect to ovarian cancer, 24 we start with irritation, inflammation 25 potential. Size of particles and shape are</p>	<p>1 about larger particles even than that. 2 It has to do with the fact 3 that -- this is complicated by the fact that 4 any consumer product -- or any talc sample 5 will have a range of sizes because they don't 6 select for one size. They select for smaller 7 than. So a 200 mesh, a 400 mesh, that has do 8 with what will filter through. 9 So pleurodesis, they try to 10 avoid for those products the really small -- 11 large amounts of less than 10 because that 12 leads to respiratory distress, whereas many 13 of the consumer talc products are using much 14 smaller, finer particles to get that feel and 15 performance they want from the consumer body 16 powders. 17 Q. Have you reviewed -- focusing 18 specific on Johnson & Johnson's products, 19 have you reviewed the documents that relate 20 to the specifications for the Johnson's 21 products with respect to the size of the 22 plate particles? 23 A. I have seen those, yes. I 24 can't tell you what each of them says without 25 pulling them out, but, yes, that is certainly</p>

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<p>1 documents I have seen and relied upon.</p> <p>2 Q. Is it consistent with your</p> <p>3 understanding that it was Johnson & Johnson's</p> <p>4 intention to select large platy talc</p> <p>5 particles for its products?</p> <p>6 MS. PARFITT: Objection to</p> <p>7 form.</p> <p>8 QUESTIONS BY MS. BRANSCOME:</p> <p>9 Q. Have you seen that in the</p> <p>10 documents?</p> <p>11 A. I don't know that it's</p> <p>12 described quite that way, but they certainly</p> <p>13 were doing a 200 mesh selection. So -- for</p> <p>14 their body powders products. So -- and they</p> <p>15 were trying -- and they did make attempts to</p> <p>16 look for sources that were more platy talc</p> <p>17 than other forms, but that doesn't ensure</p> <p>18 that everything is platy talc.</p> <p>19 Q. Are you familiar with the term</p> <p>20 "fines"?</p> <p>21 A. Yes, generally, but I'm not --</p> <p>22 but I'm not an expert in the processing of</p> <p>23 talc as far as how you would go about</p> <p>24 choosing an ore or a mine. There's others</p> <p>25 that will be addressing that. That's not my</p>	<p>1 effects that beneficiation can have on the</p> <p>2 level of the component -- the components in</p> <p>3 talc and what ultimately ends up in one of</p> <p>4 Johnson & Johnson's consumer products?</p> <p>5 MR. MEADOWS: Objection.</p> <p>6 THE WITNESS: So I'm not -- I'm</p> <p>7 not familiar with all the details, but</p> <p>8 I am familiar that it is a process</p> <p>9 they're using to attempt to result in</p> <p>10 a product that has characteristics</p> <p>11 that would be desirable for a consumer</p> <p>12 product.</p> <p>13 Again, there is my</p> <p>14 understanding that others are going to</p> <p>15 be discussing the geology or the</p> <p>16 processing, and that is not something</p> <p>17 I'm looking at.</p> <p>18 The literature as it relates to</p> <p>19 what has been tested in the public</p> <p>20 literature in particular, and that</p> <p>21 would be either an ingredient or a --</p> <p>22 or a consumer product or a -- they may</p> <p>23 discuss exposure occupationally to</p> <p>24 mining or milling, which is -- which</p> <p>25 is an issue that you can consider when</p>
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<p>1 area.</p> <p>2 Q. What is your understanding of</p> <p>3 the term "fines"?</p> <p>4 A. My understanding of the term</p> <p>5 "fines" has to be looking for a sample or a</p> <p>6 group that has been processed such that it</p> <p>7 has certain characteristics.</p> <p>8 Other than that, I would refer</p> <p>9 you to the individuals in litigation that are</p> <p>10 going to be dealing with the processing.</p> <p>11 Q. Okay. Have you taken into</p> <p>12 account in your analysis in any way the</p> <p>13 beneficiation process that occurs between the</p> <p>14 time that the talc is mined and it ends up in</p> <p>15 one of the consumer products that is relevant</p> <p>16 to your analysis?</p> <p>17 MR. MEADOWS: Objection.</p> <p>18 THE WITNESS: So what do you</p> <p>19 mean by taking it into account? Am I</p> <p>20 aware that they have something that's</p> <p>21 in place for that? Yes.</p> <p>22 But take into account, what do</p> <p>23 you mean by that?</p> <p>24 QUESTIONS BY MS. BRANSCOME:</p> <p>25 Q. Are you familiar with the</p>	<p>1 you're reviewing that literature as</p> <p>2 well.</p> <p>3 QUESTIONS BY MS. BRANSCOME:</p> <p>4 Q. Okay. And so when you cite --</p> <p>5 for example, you have a significant number</p> <p>6 of -- I'm trying to find the right paragraph.</p> <p>7 You have a section in your</p> <p>8 report where you discuss a number of</p> <p>9 different articles that relate to talc, and</p> <p>10 in parentheses you identify that the talc</p> <p>11 source might be cosmetic, it might be</p> <p>12 industrial, things of that nature, correct?</p> <p>13 A. Yes, I do that on purpose</p> <p>14 because I wanted -- I did look at the</p> <p>15 literature to understand what they were --</p> <p>16 what they were -- what type of exposure they</p> <p>17 were describing.</p> <p>18 Q. Okay. And so understanding</p> <p>19 that some of those products are not</p> <p>20 representative of what ultimately is in</p> <p>21 Johnson's baby powder, do you have anything</p> <p>22 in your report that explains how you did or</p> <p>23 did not give weight to those particular</p> <p>24 studies?</p> <p>25 MS. PARFITT: Objection. Form.</p>

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<p>1 THE WITNESS: Let me look and 2 see what I say. 3 If the question has to do with 4 numerical rankings, no, I did not do 5 that. But you're asking something 6 else, right, broader than that, 7 correct? 8 QUESTIONS BY MS. BRANSCOME: 9 Q. The question that I have is, 10 how did -- is there somewhere in this report 11 that I can understand the weight that you 12 assigned to say a study that related to 13 industrial talc as opposed to information 14 about cosmetic talc, for example? 15 MR. MEADOWS: Objection. 16 THE WITNESS: So I -- I'm -- I 17 believe I address that. I don't know 18 it's exactly answering your question, 19 but I lay out for you the 20 characteristics of the literature in 21 paragraph 37, and I point out that the 22 scientific literature varies. 23 And the fact -- and I point -- 24 and I admit -- I'm not admitting. I'm 25 stating the fact that in some cases</p>	<p>1 something that ever ended up in Johnson's 2 products, correct? 3 MR. MEADOWS: Objection. 4 THE WITNESS: I don't think I 5 can answer that yes or no. I haven't 6 done an assessment to see whether it 7 ever ended up in the products. That's 8 a different question. 9 I certainly am aware of the 10 fact that was not a primary source of 11 their talc, that is true. I do know 12 that. 13 In other words, I don't have 14 records from -- going back from 1894 15 on what the source of their talc was. 16 So I can't tell you over time. 17 What I do know, what's been put 18 into depositions and testimony of 19 company employees more recently, where 20 it's my understanding that the 21 principal sources over the years were 22 either the Vermont mine, the Italian 23 mine or the Chinese mine. And there 24 were different interruptions in time 25 where different mines were used,</p>
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<p>1 the authors will not describe it 2 specifically as the type of talc, but 3 just talc, whereas -- with no 4 description of purity or state, for 5 example. But in cases where the 6 literature does, I did consider that 7 in my weight of the evidence. 8 So, for example, when I -- when 9 I lay it out here in these bullets 10 where I'm putting for you tremolite 11 mining industrial grade cosmetic, it 12 certainly is something that I weighed. 13 And obviously as much information as I 14 can get on cosmetic-grade talc is 15 going to be most important in the 16 assessment, but that doesn't mean the 17 other information isn't relevant. 18 You want me to explain why? 19 QUESTIONS BY MS. BRANSCOME: 20 Q. Well, so, for example, you 21 describe the Dreessen article that related to 22 trimellitic talc that's mined out of 23 New York. 24 You would agree that 25 trimellitic talc from New York is not</p>	<p>1 depending on sourcing. 2 QUESTIONS BY MS. BRANSCOME: 3 Q. So as part of your expert 4 analysis where you are evaluating articles 5 that relate to different types of talc from 6 different sources of talc, have you done an 7 analysis of how those particular types of 8 talc do or do not relate to what is in the 9 consumer product manufactured by Johnson & 10 Johnson? 11 MS. PARFITT: Objection. Form. 12 THE WITNESS: The first part of 13 your question, again? I'm sorry. 14 MS. BRANSCOME: Would you read 15 it back? 16 THE WITNESS: Could you read it 17 back to me again? I didn't mean to 18 wander, but the first few words I 19 missed. 20 (Court Reporter read back 21 question.) 22 THE WITNESS: Okay. So I 23 certainly did, which is why I'm 24 breaking this out here for you this 25 way.</p>

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<p>1 So I am -- I am certainly</p> <p>2 recognizing, and I analyzed on the</p> <p>3 paper -- through the papers what type</p> <p>4 of product, if available, that the</p> <p>5 data is on.</p> <p>6 But if you read my report in</p> <p>7 the process of risk assessment, all of</p> <p>8 these categories of papers are</p> <p>9 relevant to telling you something</p> <p>10 about what talc can do. And then when</p> <p>11 you talk about drawing final</p> <p>12 conclusions, I'm looking for</p> <p>13 information, if I can, and I have it,</p> <p>14 that is on point to the product that</p> <p>15 was sold.</p> <p>16 So certainly the studies that</p> <p>17 give me information on cosmetic-grade</p> <p>18 talc are extremely important to my</p> <p>19 assessment, and they're ones that I've</p> <p>20 discussed or we've even used in trial</p> <p>21 before when we've talked about putting</p> <p>22 together a timeline.</p> <p>23 That's what this is about, by</p> <p>24 the way. This discussion here, I'm</p> <p>25 starting to lay out what information</p>	<p>1 that to draw conclusions based upon</p> <p>2 what was available for me to assess.</p> <p>3 QUESTIONS BY MS. BRANSCOME:</p> <p>4 Q. Okay.</p> <p>5 A. I don't know how else to answer</p> <p>6 it for you. That's what the section is meant</p> <p>7 to do, and that's why I broke it out that</p> <p>8 way. You know, I recognize that there is</p> <p>9 data on different things.</p> <p>10 What's interesting about even</p> <p>11 the data on different things, there's a</p> <p>12 common mechanism that is involved with the</p> <p>13 type of tissue toxicity you get, and that's</p> <p>14 irritation and inflammation. Regardless of</p> <p>15 whether it is of a certain grade or not, you</p> <p>16 get certain types of adverse reactions. May</p> <p>17 be a more sustained reaction with a</p> <p>18 industrial grade versus cosmetic grade, but</p> <p>19 they all have the capability to produce that</p> <p>20 type of adverse effect.</p> <p>21 Q. Dr. Plunkett, where can you</p> <p>22 point me to in your report that you discuss</p> <p>23 the weight that you give studies that relate</p> <p>24 to talc from New York as opposed to studies</p> <p>25 that relate to cosmetic talc that ultimately</p>
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<p>1 was available over time, and that's</p> <p>2 simply what this is. It's a survey of</p> <p>3 the literature that talks about</p> <p>4 adverse effects of talc, and if I can,</p> <p>5 I separate it into different qualities</p> <p>6 or purities.</p> <p>7 QUESTIONS BY MS. BRANSCOME:</p> <p>8 Q. Dr. Plunkett, respectfully, I</p> <p>9 don't believe you answered my question.</p> <p>10 Can you point me to anywhere in</p> <p>11 your expert report that's been produced in</p> <p>12 this MDL where you do an analysis of how the</p> <p>13 different talc types and sources that you are</p> <p>14 citing as support for the toxicity of talc</p> <p>15 generally relate to the products manufactured</p> <p>16 by Johnson & Johnson?</p> <p>17 MR. MEADOWS: Objection.</p> <p>18 THE WITNESS: So I don't know</p> <p>19 how else to answer that but to tell</p> <p>20 you I think that's what this whole</p> <p>21 section is about. I step you</p> <p>22 through -- I identify different types</p> <p>23 of evidence. I identify for you what</p> <p>24 was tested in those different pieces</p> <p>25 of evidence, and then I step through</p>	<p>1 ended up in Johnson's baby powder?</p> <p>2 MS. PARFITT: Objection. Form.</p> <p>3 THE WITNESS: I've tried to</p> <p>4 answer that for you. The weight that</p> <p>5 I'm giving -- the weight that I'm</p> <p>6 giving is part of my assessment. So,</p> <p>7 again, I don't give numerical</p> <p>8 rankings. I've answered that for you.</p> <p>9 I don't do that.</p> <p>10 What I instead do is I'm</p> <p>11 looking at everything that's relevant,</p> <p>12 everything that's available. I do</p> <p>13 categorize it, so I am selecting -- I</p> <p>14 am identifying or analyzing the</p> <p>15 information for what it describes.</p> <p>16 And then if you go further on down, I</p> <p>17 try to tell you what I think is</p> <p>18 important about that information.</p> <p>19 The overall conclusions I'm</p> <p>20 drawing in the report, though, when I</p> <p>21 cite to specific studies in the risk</p> <p>22 assessment, the majority of those</p> <p>23 studies I believe that I'm citing for</p> <p>24 you, outside of notice, have to do</p> <p>25 with -- that's more of a warnings</p>

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<p>1 issue -- have to do with the issue of</p> <p>2 cosmetic talc. Because the human</p> <p>3 studies are describing cosmetic talc.</p> <p>4 The NTP studies is a pure talc. Many</p> <p>5 of the in vitro studies and other</p> <p>6 animal studies are looking at,</p> <p>7 quote/unquote, a talc that is not an</p> <p>8 industrial grade or from a mine that</p> <p>9 would have -- be looked at in that</p> <p>10 way. So --</p> <p>11 QUESTIONS BY MS. BRANSCOME:</p> <p>12 Q. You understand that there are</p> <p>13 different types of cosmetic talc, correct?</p> <p>14 A. Yes, I am aware.</p> <p>15 Q. And cosmetic talc can be mined</p> <p>16 from a number of different mines globally,</p> <p>17 correct?</p> <p>18 A. That's correct.</p> <p>19 Q. And some of the studies that</p> <p>20 you cite in your report are testing cosmetic</p> <p>21 talc from other consumer products, for</p> <p>22 example, Cashmere Bouquet, correct?</p> <p>23 A. Some. The majority of them are</p> <p>24 not, but I would agree that some do, yes.</p> <p>25 Q. Okay. Have you done an</p>	<p>1 QUESTIONS BY MS. BRANSCOME:</p> <p>2 Q. I was simply asking: Did you</p> <p>3 do an analysis that would allow you to</p> <p>4 compare the ingredients in another product,</p> <p>5 like consumer Cashmere Bouquet, before you</p> <p>6 rendered an opinion with respect to Johnson's</p> <p>7 baby powder based on tests of Cashmere</p> <p>8 Bouquet? Did you do that analysis?</p> <p>9 MR. MEADOWS: Objection.</p> <p>10 THE WITNESS: I do not have</p> <p>11 access to internal company documents</p> <p>12 for the manufacturers of Cashmere</p> <p>13 Bouquet, so I certainly couldn't do</p> <p>14 the analysis in the same way that I</p> <p>15 can do it here, where I can identify</p> <p>16 what Johnson & Johnson and Imerys</p> <p>17 describe as sources of the talc that</p> <p>18 was used for the Johnson & Johnson</p> <p>19 baby powder, without --</p> <p>20 QUESTIONS BY MS. BRANSCOME:</p> <p>21 Q. So you have no way of knowing</p> <p>22 one way or the other whether that talc is</p> <p>23 similar, correct?</p> <p>24 MR. MEADOWS: Objection.</p> <p>25 MS. PARFITT: Objection.</p>
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<p>1 analysis of how the talc that is used in</p> <p>2 Cashmere Bouquet, for example, relates to the</p> <p>3 talc that is used in Johnson's baby powder?</p> <p>4 Is that an analysis that you</p> <p>5 have done before relying on that information</p> <p>6 in your report?</p> <p>7 MR. MEADOWS: Objection.</p> <p>8 MS. PARFITT: Objection.</p> <p>9 THE WITNESS: My analysis -- I</p> <p>10 did do an analysis to look at what was</p> <p>11 described, what products are</p> <p>12 described, but I certainly -- I</p> <p>13 certainly did not throw out studies</p> <p>14 that described Cashmere Bouquet</p> <p>15 because I would -- I still believe as</p> <p>16 a toxicologist and a risk assessor</p> <p>17 that those types of products are</p> <p>18 important to the overall weight of the</p> <p>19 evidence about the hazard and the</p> <p>20 risks posed by talc.</p> <p>21 You know, I just -- I just -- I</p> <p>22 guess I disagree with you if you're</p> <p>23 saying they're irrelevant. I don't</p> <p>24 believe that they are.</p> <p>25</p>	<p>1 THE WITNESS: Well, I think I</p> <p>2 do know it's similar, if you look on</p> <p>3 the bottle as far as what is described</p> <p>4 it being, but if you're asking me --</p> <p>5 if you're asking did we fingerprint it</p> <p>6 to only a particular mine, this is the</p> <p>7 beauty of the data. The data shows</p> <p>8 that regardless of the type of product</p> <p>9 you're looking at, there's consistency</p> <p>10 across the study.</p> <p>11 So -- but I did not try to</p> <p>12 segregate out studies that only dealt</p> <p>13 with Cashmere Bouquet, no, I did not</p> <p>14 do that.</p> <p>15 QUESTIONS BY MS. BRANSCOME:</p> <p>16 Q. Okay. As you sit here today as</p> <p>17 a toxicologist, is it your position that</p> <p>18 industrial-grade talc that might contain up</p> <p>19 to 70 percent tremolite presents the same</p> <p>20 level of toxic effect as cosmetic talc that</p> <p>21 may contain no tremolite or tremolite at a</p> <p>22 very, very low level?</p> <p>23 MS. PARFITT: Objection. Form.</p> <p>24 THE WITNESS: I haven't formed</p> <p>25 that opinion, no.</p>

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<p>1 QUESTIONS BY MS. BRANSCOME:</p> <p>2 Q. Okay. And so have you formed</p> <p>3 an opinion that I could find in your report</p> <p>4 that discusses in any way the relative</p> <p>5 toxicity of different types of talc?</p> <p>6 A. That, you may find. I need to</p> <p>7 go back and look how I set it out, but I</p> <p>8 think I -- I talked with you about the</p> <p>9 difference between fibrous versus platy. I</p> <p>10 do discuss that.</p> <p>11 And I talk about the problems</p> <p>12 when you have a complex mixture that has</p> <p>13 added to it things like asbestos and heavy</p> <p>14 metals, because I talk about the additivity</p> <p>15 issue that can come to play. So that -- in</p> <p>16 other words, increased risk when you have a</p> <p>17 complex mixture with additional components</p> <p>18 that all share the same toxic properties as</p> <p>19 far as target organs or types of effects or</p> <p>20 mechanisms that are triggered in the body.</p> <p>21 That's what I point you to.</p> <p>22 I -- I don't -- that's the only</p> <p>23 way I can answer that for you, I think, based</p> <p>24 on what I know I have in here.</p> <p>25 Q. Okay. You talk about the term</p>	<p>1 identified characteristics.</p> <p>2 There's -- within the</p> <p>3 asbestos -- the asbestos literature</p> <p>4 there's -- it's one of the forms -- forms of</p> <p>5 asbestos that's described. For example, in</p> <p>6 IARC, they describe all of the ones that have</p> <p>7 carcinogenic properties. It's one of them.</p> <p>8 Within the literature within</p> <p>9 Johnson & Johnson's documents, there's</p> <p>10 tremolite discussed as -- I assume them</p> <p>11 referring to asbestos tremolite, asbestos in</p> <p>12 a tremolite characteristic. I have seen</p> <p>13 tremolite talc also mentioned in the</p> <p>14 literature.</p> <p>15 If you want a specific</p> <p>16 discussion of each of those, again,</p> <p>17 there's -- I understand there's experts that</p> <p>18 are going to describe the distinguishing</p> <p>19 characteristics of each of those.</p> <p>20 I'm only setting out this is</p> <p>21 what I have seen, talked about, in the</p> <p>22 literature.</p> <p>23 Q. So you are not an expert on the</p> <p>24 differences between fibrous talc, asbestiform</p> <p>25 talc, non-asbestiform talc and tremolite as</p>
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<p>1 "asbestiform talc."</p> <p>2 You talk about asbestiform</p> <p>3 talc.</p> <p>4 Are you familiar with that?</p> <p>5 A. I do mention that in my report,</p> <p>6 yes.</p> <p>7 Where are you?</p> <p>8 Q. At paragraph 30. It's on</p> <p>9 page 19 of your report.</p> <p>10 A. Yes, I'm here.</p> <p>11 Q. Okay. And the first sentence</p> <p>12 in paragraph 30 you state, "In the published</p> <p>13 medical literature, there is often discussion</p> <p>14 of talc using terms such as fibrous talc,</p> <p>15 asbestiform talc, non-asbestiform talc or</p> <p>16 tremolite."</p> <p>17 Do you see that?</p> <p>18 A. Yes, I do.</p> <p>19 Q. Okay. Is it your opinion that</p> <p>20 tremolite is a form of talc?</p> <p>21 A. So tremolite is a -- is a -- is</p> <p>22 a type of fiber or a -- tremolite is a -- is</p> <p>23 a substance or an entity that has been</p> <p>24 identified as a specific morphology, I guess,</p> <p>25 identified characteristics of a -- it has</p>	<p>1 it relates to toxicity. Is that your opinion</p> <p>2 today?</p> <p>3 A. No, that's not what I'm saying.</p> <p>4 I'm saying that if you want me to -- I'm --</p> <p>5 if you want me to describe the</p> <p>6 characteristics and the morphology of each of</p> <p>7 those individually, that's something a</p> <p>8 geologist would do.</p> <p>9 But certainly as far as the</p> <p>10 toxicity assessment I did, each of these</p> <p>11 types of -- each of these words, I guess, or</p> <p>12 names have been applied in the literature</p> <p>13 when they talk about toxicity of talc. Some</p> <p>14 of the literature talks about fibrous talc or</p> <p>15 just -- other literature just talks about</p> <p>16 talc. Some of it, for example, the IARC</p> <p>17 monographs, distinguish between asbestiform</p> <p>18 talc and non-asbestiform talc in their</p> <p>19 assessments of the cancer risk.</p> <p>20 And then tremolite is discussed</p> <p>21 as a component of talc. And I have seen</p> <p>22 papers that talk about tremolite --</p> <p>23 nontremolite talc or tremolite-containing</p> <p>24 talc. That's how you most often see it.</p> <p>25 So it's the idea that it is a</p>

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<p>1 constituent of certain mines that -- and 2 that's my understanding of it. But if you 3 want -- and they all -- they all certainly do 4 show that the toxicity can be affected, 5 whether it's a fiber or a platy particle. So 6 tremolite being a fiber would certainly 7 affect my overall assessment of risk. The 8 more tremolite that you would have would 9 make -- would make it more likely to be 10 reactive in terms of a foreign body response, 11 depending on the size. 12 Q. What's your basis for saying 13 that? 14 A. That's based on a fibrous form 15 versus a platy particle form. That's the 16 issue of -- I have that paragraph where I 17 talk about what macrophages look for, can 18 engulf or not engulf. So those are all 19 things that are important to a toxicologist 20 to understand exist. 21 But certainly within my 22 assessment I have to include literature from 23 all of those because of the fact that all of 24 those are relevant to the toxicity profile, 25 since I know that the cosmetic baby powders</p>	<p>1 Q. Okay. And so when you're 2 looking at a complex mixture, you would agree 3 as a toxicologist it would be important to 4 understand the constituent elements of that 5 mixture, correct? 6 A. Yes, it is important to 7 understand that this is -- what is in the 8 mixture, and that's -- that's part of what I 9 try to do. 10 Q. Okay. And it would be 11 important before drawing conclusions from one 12 study that might have different constituent 13 components, it's important to understand the 14 relative toxicity of individual constituent 15 elements, correct? 16 A. Depends if you can or not. I 17 mean, there's certain types of studies you 18 can, where in the published literature that's 19 been described. That's why I'm pointing this 20 out. It's the idea that within the 21 literature, when you go through, it's 22 important to understand what you can say 23 about the consistency across the literature 24 where maybe different types of talc are 25 discussed.</p>
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<p>1 and the data I've seen shows detection of 2 something called fibrous talc. 3 I see detection of tremolite 4 within certain samples of baby powder. 5 And then I have just the 6 general category of asbestiform versus 7 non-asbestiform when I consider the way, for 8 example, IARC has reviewed the 9 carcinogenicity. 10 So those are -- those are terms 11 that I'm laying out because I think they are 12 something you need to understand exists in 13 the literature. 14 Q. Okay. But I'm trying to 15 understand, not helping me understand the 16 literature. I'm trying to understand your 17 opinions with respect to toxicity. 18 Is it, for example, your 19 opinion that fibrous talc has the same toxic 20 potential -- let's focus specifically with 21 respect to ovarian cancer -- as tremolite? 22 A. I haven't formed that opinion, 23 but, again, I would -- my opinion has been 24 formed on the fact that we have complex 25 mixture that includes all of these things.</p>	<p>1 And that's what I -- I think I 2 lay out for you. I tell you there's 3 consistency in certain toxic effects that are 4 seen. Regardless of the form that you're 5 looking at, talc has certain properties, and 6 all of these things are -- been shown to be 7 in the complex mixture, so I have -- as a 8 result, all of that literature has relevance 9 to at least the hazard part of my assessment, 10 and certainly have relevance to -- when you 11 want to talk about warning and the final risk 12 assessment, they're definitely relevant, but 13 certainly the -- when I go through this 14 process, I am trying to focus as much as I 15 can on a product that is most similar to the 16 one I'm assessing. 17 So obviously that's why -- 18 that's one of the reasons I do look at the 19 human data, because the human data is 20 involving a consumer product use, which is 21 what I'm talking about here. 22 Q. Is it using specifically 23 Johnson's baby powder? 24 A. Many of them are, yes. 25 Q. Okay.</p>

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<p>1 A. Based on my understanding of 2 what I see discussed within the literature. 3 Q. Did you identify in your report 4 specifically which report -- which studies 5 have used a consumer product manufactured by 6 Johnson & Johnson? 7 A. I haven't laid them out 8 individually, no, but I am aware of 9 discussions of this general issue within some 10 of the documents I've seen, and essentially 11 Johnson's body powders products were the 12 overwhelming share of the market. 13 Q. But you would agree that 14 studies that did not involve the consumer 15 product manufactured by Johnson & Johnson 16 should be given less weight when analyzing 17 whether or not there are risks associated 18 specifically with Johnson & Johnson's 19 products? 20 MS. PARFITT: Objection. Form. 21 MR. MEADOWS: Objection. 22 THE WITNESS: It depends on the 23 question being asked within the 24 assessment, the risk assessment. It 25 really does, I mean, because each of</p>	<p>1 across the studies that are dealing 2 with not the consumer product but 3 other descriptions, there is a 4 consistency in the types of effects 5 you see. 6 And since I'm not quantifying 7 the risk but identifying it as being 8 increased or not, in other words, is 9 it more likely than not that someone 10 exposed in this way could be at a risk 11 of ovarian cancer, that's what I'm 12 talking about. 13 So again, it's -- if I was 14 trying to identify differences in 15 cancer potency factors for different 16 types, then, yes, if I had an animal 17 study on each of those, I could 18 compare potency for cancer, but that 19 hasn't been done. 20 QUESTIONS BY MS. BRANSCOME: 21 Q. Okay. 22 A. So instead, what I have to do 23 is rely on what is available to me. And 24 based on my judgment, that's how I review the 25 studies.</p>
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<p>1 these studies brings a piece of 2 evidence to the risk assessment. 3 And so the question is -- for 4 each one, you consider it on a 5 case-by-case basis. It is possible, 6 yes, that you would give less weight. 7 It's also possible that you would not, 8 dependent upon what you know about 9 that study and how it relates to other 10 studies that are out there. 11 QUESTIONS BY MS. BRANSCOME: 12 Q. So methodologically, how would 13 I understand from your report marked as 14 Exhibit 4 under what circumstances to give a 15 study that relates to, for example, 16 industrial talc less weight than a study that 17 actually used Johnson's baby powder? 18 MR. MEADOWS: Objection. 19 THE WITNESS: Well, I've tried 20 to tell you that. That's what I said 21 for you. That's why I am doing it. I 22 certainly am trying to focus in on 23 studies that deal with the consumer 24 product. 25 But what I find when I look</p>	<p>1 Q. And so for the opinions that 2 you are offering in the MDL, you agree that 3 you are not quantifying the risk associated 4 with Johnson's baby powder, SHOWER TO SHOWER® 5 or Shimmer with respect to the potential for 6 causing ovarian cancer? 7 MS. PARFITT: Objection. Form. 8 THE WITNESS: In terms of a 9 cancer potency factor, that is true, I 10 am not. Instead, what I am doing is I 11 am quantifying whether or not I 12 believe that the risk is increased 13 above a background risk. 14 That has to do with -- that's 15 where I bring in, in my risk 16 assessment, the human data, because 17 the human data is showing 18 statistically significant increases in 19 risk in populations using the consumer 20 product. 21 So I have a quantification 22 where I'm using the word "increased," 23 and I believe to a reasonable degree 24 of medical certainty that indeed the 25 risk is increased. So I'm quantifying</p>

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<p>1 in that way, but I'm not giving it a 2 number. I'm not saying that the 3 cancer potency factor is such that you 4 increase the risk from one in a 5 million to 10 in a million to 1 in a 6 thousand. That I have not done 7 because I don't have the data, the 8 studies. The company has not done 9 studies on each of these to allow me 10 to do that.</p> <p>11 QUESTIONS BY MS. BRANSCOME: 12 Q. Okay. The reference that you 13 made to the human data that you believe shows 14 a statistically increased risk in populations 15 using the consumer product, have -- which -- 16 have you identified in your report which of 17 those studies are specifically using a 18 product that was manufactured by Johnson & 19 Johnson?</p> <p>20 A. I don't lay that out for my 21 report, I do not, but certainly it is 22 something that for some of the studies I 23 believe you can -- you might be able to get 24 some of that information from. But certainly 25 I have not laid that out individually in my</p>	<p>1 QUESTIONS BY MS. BRANSCOME: 2 Q. In reaching your opinion in the 3 MDL that there is an increased risk above 4 background of ovarian cancer from the use of 5 products manufactured by Johnson & Johnson, 6 have you made an attempt to identify 7 specifically which studies, the human studies 8 on which you rely, test or look at people who 9 have used Johnson & Johnson's products?</p> <p>10 MS. PARFITT: Objection. Form. 11 THE WITNESS: It's my -- my 12 review of the study indicates that I 13 would say for the vast majority of 14 them you cannot do that.</p> <p>15 But you can take what is 16 reported and look at things such as 17 market share and those kind of things 18 to get an idea of what you believe the 19 exposure would have been.</p> <p>20 But certainly I have not -- I 21 have not tried to apply some kind of a 22 numerical value to how many people in 23 the study may have used Johnson's baby 24 powder or not, no, that has not been 25 done. I don't think anybody -- any of</p>
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<p>1 report, no. 2 Q. And you would agree that for 3 some of those studies there is no information 4 as to the specific type of consumer talc that 5 the individuals who are being studied used, 6 correct?</p> <p>7 MS. PARFITT: Objection. Form. 8 THE WITNESS: I would agree 9 that in some of those studies they're 10 not saying, but that is why you look 11 at the evidence overall.</p> <p>12 And what's important to look at 13 in terms of now -- if you wanted to go 14 to Bradford Hill, that's why you look 15 at things such as consistency. So 16 what do the studies show. We see a 17 certain level of increased risk across 18 studies, regardless of who did the 19 study or what population was being 20 looked at.</p> <p>21 So that's the best way I can 22 answer that for you. That is -- that 23 is part of the -- of the assessment 24 that you look at. 25</p>	<p>1 the bodies that have looked at this 2 have done that.</p> <p>3 QUESTIONS BY MS. BRANSCOME: 4 Q. You have not done a market 5 share analysis, correct?</p> <p>6 A. No, I've seen this in documents 7 only. I have not done my own. There are 8 company documents that talk about their 9 market share.</p> <p>10 Q. Okay. Have you made an attempt 11 to examine the levels of fibrous talc or 12 asbestiform talc that are in different 13 consumer products, aside from Johnson's baby 14 powder or SHOWER TO SHOWER® or Shimmer?</p> <p>15 A. So for that are you referring 16 to things such as -- other types of cosmetics 17 like foundations or lipsticks or --</p> <p>18 Q. I'll rephrase. 19 Have you made any attempt to 20 examine whether other cosmetic talc body 21 powders have a different percentage of 22 fibrous, or what you refer to as asbestiform 23 talc, from the Johnson & Johnson products?</p> <p>24 Have you done any analysis to 25 make that comparison one way or the other?</p>

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<p>1 MS. PARFITT: Objection. Form.</p> <p>2 THE WITNESS: I certainly</p> <p>3 haven't done -- I certainly didn't do</p> <p>4 a directed analysis to try to</p> <p>5 determine that, but there is</p> <p>6 information, I believe, in -- I think</p> <p>7 if you look at some of Dr. Longo's</p> <p>8 work, that may be there.</p> <p>9 And I believe in Dr. Blount's</p> <p>10 published paper there may be a</p> <p>11 discussion of the type of powder</p> <p>12 product used, where she was looking</p> <p>13 for -- at least for asbestiform --</p> <p>14 asbestos within the talc. It may be</p> <p>15 tremolite as well, but -- if you want</p> <p>16 me to look, I can do that. I just</p> <p>17 don't recall whether -- I think she</p> <p>18 did talk about sources of the talc,</p> <p>19 where it came from, so...</p> <p>20 QUESTIONS BY MS. BRANSCOME:</p> <p>21 Q. Okay. But as you sit here</p> <p>22 today, you can't point me to any analysis</p> <p>23 that you did or an analysis that you relied</p> <p>24 on that would relate different brands of</p> <p>25 cosmetic talc body powders with respect to</p>	<p>1 that I state for you that it's my</p> <p>2 opinion that Cashmere Bouquet has this</p> <p>3 specific pattern of constituents as</p> <p>4 compared to Johnson & Johnson's. No,</p> <p>5 I have not done that.</p> <p>6 QUESTIONS BY MS. BRANSCOME:</p> <p>7 Q. Okay. And that would be true</p> <p>8 for any other brand of cosmetic talc, body</p> <p>9 powders, Jean Nate, Lily of the Valley, not</p> <p>10 just Cashmere Bouquet, correct?</p> <p>11 MS. PARFITT: Objection.</p> <p>12 THE WITNESS: That is correct,</p> <p>13 I don't have access to that</p> <p>14 information.</p> <p>15 QUESTIONS BY MS. BRANSCOME:</p> <p>16 Q. Have you done any analysis of</p> <p>17 the constituent components of talc and how</p> <p>18 they have changed even within Johnson's --</p> <p>19 Johnson & Johnson's manufactured products,</p> <p>20 how the constituents of the consumer products</p> <p>21 may or may not have changed over time?</p> <p>22 A. I've done some of that, yes,</p> <p>23 and I laid that out, I think, for you, when I</p> <p>24 talk about the differences in the products</p> <p>25 that are described within the documents, the</p>
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<p>1 their constituent components?</p> <p>2 MS. PARFITT: Objection.</p> <p>3 Completely misstates her testimony.</p> <p>4 She mentioned Dr. Blount. She</p> <p>5 mentioned others.</p> <p>6 THE WITNESS: So I think what I</p> <p>7 started with, I said I haven't done a</p> <p>8 directed analysis to try to determine</p> <p>9 specifically how this product versus</p> <p>10 this product versus this product may</p> <p>11 have looked over time, because I don't</p> <p>12 have access to a full data to do that.</p> <p>13 But what I do have is data that</p> <p>14 has -- I do see published data, for</p> <p>15 example, Blount and maybe some of the</p> <p>16 other published studies, that looked</p> <p>17 at this issue, at least of asbestos</p> <p>18 presence in talc. And I believe</p> <p>19 Dr. Longo also had things that weren't</p> <p>20 just Johnson's. I believe he had</p> <p>21 Cashmere Bouquet, for example, samples</p> <p>22 in some of the things he looked at.</p> <p>23 So I can point you to those</p> <p>24 things that I have reviewed, but I</p> <p>25 haven't -- there's nowhere in here</p>	<p>1 company documents, from the '70s versus the</p> <p>2 '80s versus later on, as far as the changes</p> <p>3 that were made to specifications of the</p> <p>4 product, for example. That's something --</p> <p>5 and I think I've talked about that a bit at</p> <p>6 trial as well.</p> <p>7 Q. Okay. And is it your view that</p> <p>8 the risk potential for Johnson & Johnson's</p> <p>9 manufactured products have changed at all</p> <p>10 over time with respect to ovarian cancer?</p> <p>11 MS. PARFITT: Objection.</p> <p>12 THE WITNESS: I have not -- I</p> <p>13 have not attempted to differentiate a</p> <p>14 risk potential at only one point in</p> <p>15 time.</p> <p>16 What I have done over points of</p> <p>17 time is looked at the issue of</p> <p>18 warnings and what should be warned</p> <p>19 about.</p> <p>20 But my analysis related to the</p> <p>21 hazard or the risk assessment of the</p> <p>22 products is considering all of the</p> <p>23 available information, which would be</p> <p>24 all of that information over time.</p> <p>25</p>

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<p>1 QUESTIONS BY MS. BRANSCOME:</p> <p>2 Q. Okay. You talk about, in</p> <p>3 paragraph 35 primarily -- we'll talk about</p> <p>4 the fragrance components in more detail, but</p> <p>5 you talk about the idea of chemicals being a</p> <p>6 potential irritant.</p> <p>7 Are you familiar with that?</p> <p>8 A. Yes, that's correct.</p> <p>9 Q. Is it your position that any</p> <p>10 product that contains chemicals that could be</p> <p>11 an irritant should be labeled with a health</p> <p>12 warning?</p> <p>13 MS. PARFITT: Objection.</p> <p>14 MR. MEADOWS: Okay.</p> <p>15 THE WITNESS: I don't think</p> <p>16 that's -- no, I don't think I've</p> <p>17 formed that specific opinion.</p> <p>18 But the opinion that I think</p> <p>19 I'm expressing here is that when you</p> <p>20 have a -- the information that I have,</p> <p>21 which unfortunately the company hasn't</p> <p>22 given us percentages or actual levels,</p> <p>23 instead, what I do as a toxicologist,</p> <p>24 I look at what is there. And when I</p> <p>25 see over a hundred chemicals there,</p>	<p>1 you with specific percentages, and so I'm</p> <p>2 asking you, is that something that as a</p> <p>3 toxicologist would be important information</p> <p>4 to you?</p> <p>5 A. Depends. Certainly with the</p> <p>6 fragrance -- and I'm talking about the</p> <p>7 conversation about this paragraph is focusing</p> <p>8 on the fragrance components.</p> <p>9 So, yes, I mention that it</p> <p>10 would be nice to know, it would be good to</p> <p>11 know, if we could, exactly what was in there,</p> <p>12 because I could quantify the hazard or</p> <p>13 quantify the risk, actually. So instead, I</p> <p>14 have -- I identify it as a hazard, but I</p> <p>15 can't quantify it without those levels.</p> <p>16 But does that change -- make a</p> <p>17 difference in the overall conclusions I draw?</p> <p>18 No, it doesn't affect the overall conclusions</p> <p>19 that I have drawn, but it adds that other</p> <p>20 piece of the puzzle that deals with the fact</p> <p>21 that we have a complex mixture that have a</p> <p>22 combination of ingredients that target</p> <p>23 irritation.</p> <p>24 And irritation and the</p> <p>25 potential to produce an inflammatory</p>
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<p>1 that 70 percent of them have been</p> <p>2 linked as an irritant hazard, there is</p> <p>3 the issue of toxicological additivity</p> <p>4 to consider.</p> <p>5 So certainly as a risk</p> <p>6 assessor, when I have that many</p> <p>7 potential sources of irritation as far</p> <p>8 as chemicals going into a complex</p> <p>9 mixture, certainly I think I have</p> <p>10 formed the opinion that I think that</p> <p>11 is something that needs to be</p> <p>12 considered when you're talking about</p> <p>13 providing information to consumers,</p> <p>14 yes.</p> <p>15 QUESTIONS BY MS. BRANSCOME:</p> <p>16 Q. As a toxicologist, would it be</p> <p>17 important to you to understand the exact</p> <p>18 percentages of all of the constituent</p> <p>19 components of, say, Johnson's baby powder,</p> <p>20 for example?</p> <p>21 A. Are you talking about just the</p> <p>22 fragrance or are you talking about everything</p> <p>23 that's in it?</p> <p>24 Q. Dr. Plunkett, you referenced</p> <p>25 the fact that the company has not provided</p>	<p>1 response, in my -- if you've read my report,</p> <p>2 you understand that I think that's a key</p> <p>3 factor in increasing the risk for ovarian</p> <p>4 cancer.</p> <p>5 Q. Understanding the percentages</p> <p>6 of the constituent components, is that</p> <p>7 limited only to fragrance, or would it also</p> <p>8 be important to understand the percentages</p> <p>9 for the heavy metals that you contend are in</p> <p>10 Johnson's baby powder?</p> <p>11 A. So if I was trying to define</p> <p>12 the hazard of each component, I would</p> <p>13 certainly want one to know that. As a</p> <p>14 result, what I'm doing instead is looking at</p> <p>15 the complex mixture. In other words, this is</p> <p>16 a mixture of all these things.</p> <p>17 I break out those individual</p> <p>18 components, or constituents, to tell you</p> <p>19 about the hazard that is brought to play or</p> <p>20 the toxicity profiles that exists. And</p> <p>21 what's important about that in my overall</p> <p>22 evaluation of the end product, which is what</p> <p>23 my risk assessment is based on, the end</p> <p>24 product, shows that I have multiple</p> <p>25 components with similar types of effects.</p>

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<p>1 And as a toxicologist, when you do that, that</p> <p>2 affects the conclusion that you can draw</p> <p>3 about a body of literature.</p> <p>4 Q. Okay. You do understand that</p> <p>5 there is testing data available about the</p> <p>6 percentages of the constituent components</p> <p>7 with respect to heavy metals, et cetera, that</p> <p>8 have been in Johnson's baby powder over time,</p> <p>9 correct?</p> <p>10 A. There is some information.</p> <p>11 Unfortunately, the information is not</p> <p>12 complete as to every lot or every sample, as</p> <p>13 far as what I have seen. And also, there's</p> <p>14 some -- some of the sampling is reported as</p> <p>15 more of a limit versus an actual</p> <p>16 quantification. So it depends upon which --</p> <p>17 which result, study result or document,</p> <p>18 you're looking at.</p> <p>19 There is some there, yes, and</p> <p>20 that's one of the reasons why I identified</p> <p>21 these as part of my risk assessment, because</p> <p>22 I look for a pattern of these metals that are</p> <p>23 known to carry a hazard and whether or not</p> <p>24 these are ones I'm seeing detected time and</p> <p>25 time again.</p>	<p>1 using a word such as an increase -- an</p> <p>2 increased risk.</p> <p>3 Is that a specific number? Am</p> <p>4 I telling you that it's increased by two</p> <p>5 times or four times or six times? No. The</p> <p>6 data available did not allow us to do that,</p> <p>7 with the exception of the epidemiological</p> <p>8 data. And the epidemiological data can show</p> <p>9 you that in that piece of evidence there</p> <p>10 appears to be a 30 percent increased risk</p> <p>11 above background.</p> <p>12 Q. Did you make an attempt to</p> <p>13 quantify the risk with the data that you had</p> <p>14 available to you with respect to the final</p> <p>15 consumer product?</p> <p>16 A. I could not, based on the data</p> <p>17 I had, because I didn't have a</p> <p>18 well-controlled animal study to be able to</p> <p>19 pull that out that way.</p> <p>20 Instead, what I -- in this type</p> <p>21 of weight of the evidence, you look at what</p> <p>22 you might be able to quantify based on the</p> <p>23 human data. And certainly the human data</p> <p>24 showing the statistically significant</p> <p>25 consistent findings across studies for that</p>
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<p>1 Q. But you made no attempt to</p> <p>2 quantify the risk with respect to any of</p> <p>3 those components or use that data in any way,</p> <p>4 correct?</p> <p>5 MS. PARFITT: Objection. Form.</p> <p>6 THE WITNESS: No, I used</p> <p>7 that -- that data as part of -- my</p> <p>8 risk assessment as part of my hazard</p> <p>9 assessment, absolutely. It's part of</p> <p>10 the hazard assessment.</p> <p>11 But as far as quantifying them</p> <p>12 individually, no. I am quantifying</p> <p>13 the risk and looking at the risk of</p> <p>14 the entire product, not of just one</p> <p>15 individual component of the product.</p> <p>16 QUESTIONS BY MS. BRANSCOME:</p> <p>17 Q. Well, we already discussed</p> <p>18 you're not quantifying the risk with respect</p> <p>19 to the entire product, correct?</p> <p>20 A. Well, I'm quantifying it in</p> <p>21 terms of an increase above background, which</p> <p>22 I'm not giving you a -- I told you I wasn't</p> <p>23 giving you a cancer potency factor. That is</p> <p>24 true. That I am not doing.</p> <p>25 But I am quantifying it by</p>	<p>1 30 percent increased risk, that is part of my</p> <p>2 overall weight of the evidence for me making</p> <p>3 the statement the risk is increased.</p> <p>4 But you'll notice I don't say</p> <p>5 increased risk of 30 percent, because I don't</p> <p>6 believe that I can state that with certainty</p> <p>7 in the way I do a risk assessment. But</p> <p>8 certainly as any one individual -- any one</p> <p>9 individual piece of evidence or any one body,</p> <p>10 like the epi data, others have made -- other</p> <p>11 bodies who have looked at the -- talked about</p> <p>12 the consistency of the increased risk signal</p> <p>13 in the epi studies as being in the range of</p> <p>14 30 percent.</p> <p>15 Q. Okay. But you would agree that</p> <p>16 based on the methodology that you applied in</p> <p>17 this case, you could not say to a reasonable</p> <p>18 degree of scientific certainty that there is</p> <p>19 an increased risk of, for example, 30 percent</p> <p>20 with respect to use of Johnson's baby powder</p> <p>21 and ovarian cancer, correct?</p> <p>22 MR. MEADOWS: Objection.</p> <p>23 THE WITNESS: I have not done</p> <p>24 that. And I'm not saying that</p> <p>25 somebody else couldn't do that. I</p>

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<p>1 have not -- I have not chosen to do 2 that based on my evaluation of the 3 data. 4 QUESTIONS BY MS. BRANSCOME: 5 Q. And the same would be true if I 6 asked that question and substituted any 7 particular number, a 10 percent increased 8 risk, a 20 percent increased risk, correct? 9 MR. MEADOWS: Objection. 10 THE WITNESS: I haven't given a 11 specific number in my final opinions, 12 that is true. 13 QUESTIONS BY MS. BRANSCOME: 14 Q. Okay. 15 A. I've tried to explain to you 16 what evidence I do think is there, however. 17 Q. Now, we've talked about 18 different types of talc that might have 19 different constituent components, but you 20 also look at exposure to talc in an 21 occupational setting. 22 Do you recall that? 23 A. Some of the studies that I've 24 relied upon, yes, some of them were 25 occupational.</p>	<p>1 Q. Is it your opinion as you sit 2 here today that someone could develop ovarian 3 cancer through -- exclusively through the 4 inhalation of Johnson's baby powder? 5 MS. PARFITT: Objection. 6 THE WITNESS: I haven't formed 7 that opinion at this point in time. 8 QUESTIONS BY MS. BRANSCOME: 9 Q. Have you done any analysis or 10 can you point me to any analysis in your 11 report that makes a comparison of the 12 exposure levels that might be seen in an 13 occupational setting to what would be seen by 14 a consumer? 15 A. Are you asking me for a piece 16 of evidence that does that comparison, or is 17 there evidence that allows you to do that 18 comparison? 19 Q. Have you cited or discussed any 20 of the evidence or done an analysis in any 21 way that would compare exposure levels in an 22 occupational setting to what you would 23 anticipate a consumer using Johnson's baby 24 powder might be exposed to? 25 A. I don't think I did it as a</p>
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<p>1 Q. Okay. And you understand that 2 in an occupational setting, you would agree 3 that the exposure, particularly via 4 inhalation, would be much higher than it 5 would be through the use of a consumer 6 product, correct? 7 A. It depends on the occupation, 8 but, yes. For example, I would agree a miner 9 would be expected to have that, but there are 10 certain, quote/unquote, occupational studies 11 where the exposure levels that -- for 12 example, there are -- I believe there's at 13 least one study that looked at application of 14 talc powders in -- maybe in a material, 15 coating materials in a factory. Those kinds 16 of studies would be different than a mining 17 study. 18 But, certainly, yes, I 19 understand that occupational studies, the 20 inhalation exposure is the pathway that would 21 be predominant versus in the consumer body 22 powder use, I'm talking about the predominant 23 exposure pathway in my opinion is going to be 24 through perineal use, even though inhalation 25 exposure can occur.</p>	<p>1 separate analysis, but as part of my analysis 2 I considered evidence that showed -- provided 3 me with such data. So, for example, if you 4 want, I can point you to a -- I have an 5 inhalation paragraph, I think. 6 Let me look for it real quick. 7 See if I can find it quickly for you. I 8 don't want to waste your time. 9 Q. Sure. 10 A. So there's -- I don't see it 11 cited here, but there's at least one document 12 I reviewed where the company themselves made 13 a comparison, and I have seen that, of 14 inhalation exposure to talc suspended in air 15 with diapering. Dr. Longo has done a 16 measurement of exposure in air with perineal 17 application of talc. So I'm aware of those 18 studies. 19 And then I certainly am aware 20 of the fact that those numbers are different, 21 or smaller, than many of the numbers I see 22 reported in some of the occupational studies. 23 But I can't say that's true for all. 24 I would certainly, though, say 25 that if you're just talking inhalation, I</p>

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<p>1 certainly would expect a miner or a miller to</p> <p>2 have a greater potential for inhalation</p> <p>3 exposure than routine use of the consumer</p> <p>4 product, with the exception of the studies --</p> <p>5 the reports of large amounts of exposure in</p> <p>6 children where the inhalation -- where they</p> <p>7 were inhaling large amounts of powder.</p> <p>8 And so that's a different</p> <p>9 story. That's sort of an acute overdose</p> <p>10 exposure, I guess, versus the typical daily</p> <p>11 exposure through occupational or consumer</p> <p>12 use.</p> <p>13 Q. And that raises an interesting</p> <p>14 question. You discuss health hazards</p> <p>15 associated with talc being known, and in some</p> <p>16 cases deaths had been reported.</p> <p>17 You're aware that those relate</p> <p>18 to asphyxiation deaths, correct?</p> <p>19 A. Or long-term injury to lungs.</p> <p>20 Maybe not an immediate asphyxiation, but lung</p> <p>21 damage produced by large amounts -- some of</p> <p>22 the children would go to the hospital and be</p> <p>23 sick for a while and then die. So they</p> <p>24 didn't asphyxiate immediately, right? But</p> <p>25 some of them did. You're exactly right.</p>	<p>1 QUESTIONS BY MS. BRANSCOME:</p> <p>2 Q. Okay. Now, you would agree</p> <p>3 that -- so let's set aside inhalation.</p> <p>4 You agree that for talc -- for</p> <p>5 Johnson's baby powder or another one of</p> <p>6 Johnson & Johnson's consumer talc products to</p> <p>7 reach an individual's ovaries, it must pass</p> <p>8 from the perineum, through the vagina and the</p> <p>9 cervical canal, move across the uterus -- and</p> <p>10 again, it's the ciliary motion of the</p> <p>11 fallopian tubes -- cross the peritoneal space</p> <p>12 between the fimbriae and ovaries, escape</p> <p>13 phagocytosis in the peritoneal space, and</p> <p>14 then attach to the surface of the ovaries,</p> <p>15 correct?</p> <p>16 MS. PARFITT: Objection. Form.</p> <p>17 MR. MEADOWS: Okay.</p> <p>18 THE WITNESS: If the issue is</p> <p>19 attaching to the surface, yes.</p> <p>20 There's also some information</p> <p>21 indicates the site of attack may be</p> <p>22 actually at the fallopian tube exit to</p> <p>23 the peritoneum. But, yes, that's</p> <p>24 correct, there's been some discussion</p> <p>25 in the literature on ovarian cancer</p>
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<p>1 Both of those things occur, and</p> <p>2 I address that also in my warning section</p> <p>3 about the fact that that warning didn't --</p> <p>4 was not put on the product for a long period</p> <p>5 of time even though those types of reports</p> <p>6 were coming in early.</p> <p>7 Q. You would agree that that is a</p> <p>8 completely different biologic mechanism than</p> <p>9 what you are proposing the biological</p> <p>10 mechanism is for ovarian cancer to develop</p> <p>11 with respect to talc use, correct?</p> <p>12 MR. MEADOWS: Objection.</p> <p>13 THE WITNESS: I would agree</p> <p>14 that it's an acute response versus</p> <p>15 chronic, yes, that I agree with.</p> <p>16 It's not entirely different in</p> <p>17 some cases because some of the tissue</p> <p>18 reactions you saw were indicative of</p> <p>19 irritation when some of the lung</p> <p>20 samples were looked at. But</p> <p>21 certainly, yes, that's acute exposure</p> <p>22 versus chronic exposure, and I'm</p> <p>23 focusing on ovarian cancer on chronic</p> <p>24 exposure scenarios.</p> <p>25</p>	<p>1 about whether the tumors are arising</p> <p>2 in the tubes versus the ovaries.</p> <p>3 But I would agree, I think</p> <p>4 both -- I think both of those</p> <p>5 things -- those things -- there is a</p> <p>6 passage that has to happen, regardless</p> <p>7 of whether the end point is at the</p> <p>8 fallopian tube or at the ovary.</p> <p>9 QUESTIONS BY MS. BRANSCOME:</p> <p>10 Q. Okay. Is it your view that the</p> <p>11 consensus has been reached that ovarian</p> <p>12 cancer can be caused by talc landing in the</p> <p>13 fallopian tubes?</p> <p>14 A. I haven't formed that opinion,</p> <p>15 though I do believe this will be discussed by</p> <p>16 some of the other experts.</p> <p>17 Q. Okay. Have you personally</p> <p>18 conducted any tests or experiments to confirm</p> <p>19 the theory that talc migrates from</p> <p>20 application at the perineum to the ovaries?</p> <p>21 A. If by that you mean something</p> <p>22 where I performed a laboratory test myself,</p> <p>23 no, I have not done that.</p> <p>24 Q. As a toxicologist, are you</p> <p>25 capable of doing that?</p>

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<p>1 A. Yes, I believe if asked I</p> <p>2 could -- I could attempt to design something</p> <p>3 to look at that issue.</p> <p>4 Q. Okay.</p> <p>5 A. But I would argue that I think</p> <p>6 it doesn't make a lot of sense to revisit</p> <p>7 based upon what we already know from the</p> <p>8 scientific literature and the review papers</p> <p>9 from the gynecological community. I believe</p> <p>10 it's -- it's understood that it can migrate.</p> <p>11 Q. In your opinion, has an animal</p> <p>12 model been successfully developed that would</p> <p>13 allow the testing of talc migration in humans</p> <p>14 from the perineum to the ovaries?</p> <p>15 A. I think I tell that you in my</p> <p>16 report. I believe that the human data is the</p> <p>17 relevant data to look at this issue.</p> <p>18 So it would be very difficult</p> <p>19 to design a study to do this based on the</p> <p>20 typical laboratory species that are used in</p> <p>21 toxicology testing. Even -- even the monkeys</p> <p>22 have issues, and the biggest issues with</p> <p>23 monkeys is the ethicality of using a monkey</p> <p>24 to settle -- to address a question that I</p> <p>25 believe is settled within the gynecological</p>	<p>1 And then on top of that, you</p> <p>2 have the review articles that talk about</p> <p>3 migration of particles in the female</p> <p>4 reproductive tract and are describing it as</p> <p>5 an event that is known to occur. So it's</p> <p>6 those things weighed together.</p> <p>7 But certainly routine could be</p> <p>8 supported by the observations where the</p> <p>9 majority of the patients in the studies were</p> <p>10 showing movement of inert particles.</p> <p>11 Q. Is it your opinion that every</p> <p>12 perineal application of cosmetic talc powder</p> <p>13 results in talc being deposited on the</p> <p>14 ovaries?</p> <p>15 A. I have not formed that opinion,</p> <p>16 no.</p> <p>17 Q. Have you formed an opinion as</p> <p>18 to with what frequency -- so let's say</p> <p>19 someone uses a cosmetic talc on a perineal</p> <p>20 application ten times. Out of those ten</p> <p>21 times, have you formed an opinion as to how</p> <p>22 many of those instances would talc deposit on</p> <p>23 the ovaries?</p> <p>24 MS. PARFITT: Objection.</p> <p>25 THE WITNESS: I haven't formed</p>
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<p>1 and scientific community.</p> <p>2 Q. Now, you state in your report</p> <p>3 that talc that's applied through perineal</p> <p>4 use -- I believe the term you use --</p> <p>5 routinely migrates to the ovaries.</p> <p>6 Is that your opinion?</p> <p>7 A. Are you reading from my report?</p> <p>8 MR. MEADOWS: To the extent</p> <p>9 that question is still lingering, I</p> <p>10 object to it.</p> <p>11 QUESTIONS BY MS. BRANSCOME:</p> <p>12 Q. On paragraph 43 on page 29.</p> <p>13 A. So I think as I've stated it,</p> <p>14 the studies that I have reviewed demonstrate</p> <p>15 that inert particles routinely move from the</p> <p>16 lower female reproductive tract up into</p> <p>17 fallopian tubes and towards the ovaries.</p> <p>18 Q. What do you mean by routinely?</p> <p>19 A. It's the percentages of</p> <p>20 movement that are reported in the patients.</p> <p>21 In other words, if you look at some of the</p> <p>22 individual studies -- if you want we can pull</p> <p>23 them out, but, you know, eight of ten</p> <p>24 patients, nine of ten patients, all the</p> <p>25 patients showed movement of the particles.</p>	<p>1 an opinion in that particular way, no.</p> <p>2 I think what I've -- I've tried to</p> <p>3 describe to you in my report is that I</p> <p>4 believe it is known that inert</p> <p>5 particles have the ability to migrate.</p> <p>6 And based on that, I form the opinion</p> <p>7 that it's my opinion to a reasonable</p> <p>8 degree of scientific certainty, which</p> <p>9 would be a more likely than not</p> <p>10 standard, that particles of talc would</p> <p>11 be migrating when women are using them</p> <p>12 perineally. But I haven't told you</p> <p>13 that it has to be a specific number,</p> <p>14 no.</p> <p>15 QUESTIONS BY MS. BRANSCOME:</p> <p>16 Q. Have you done any analysis to</p> <p>17 establish over a lifetime use of cosmetic</p> <p>18 talc where the app -- the perineal</p> <p>19 application, with what frequency during a</p> <p>20 lifetime the talc may have been deposited on</p> <p>21 that individual's ovaries?</p> <p>22 A. So I certainly looked for</p> <p>23 information to allow me to assess that, but</p> <p>24 unfortunately those kinds of studies would be</p> <p>25 unethical to do. Because that would be a</p>

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<p>1 matter of sampling women during -- using them</p> <p>2 and then taking biopsies, and that's</p> <p>3 something that would be difficult to do. I</p> <p>4 would say impossible to get approval to do</p> <p>5 under human testing guidelines.</p> <p>6 Q. Okay. So it's your opinion</p> <p>7 that it is possible for talc that is applied</p> <p>8 through a perineal application to reach the</p> <p>9 ovaries, but you cannot say with what</p> <p>10 frequency that occurs?</p> <p>11 MS. PARFITT: Objection. Form.</p> <p>12 Misstates her testimony.</p> <p>13 THE WITNESS: That's not --</p> <p>14 what I'm telling you is, I think it --</p> <p>15 that to a reasonable degree of</p> <p>16 scientific certainty that it migrates,</p> <p>17 and that would be the standard of more</p> <p>18 likely than not. I think it's more</p> <p>19 likely than not that the talc is</p> <p>20 reaching the ovaries when people are</p> <p>21 using it perineally.</p> <p>22 I did form the opinion -- and</p> <p>23 I've talked about this at trial and</p> <p>24 yesterday. I have formed the opinion</p> <p>25 that this is a issue of chronic or --</p>	<p>1 MS. BRANSCOME: Okay. Can we</p> <p>2 just go off the record for a second?</p> <p>3 VIDEOGRAPHER: We are going off</p> <p>4 the record at 12:23 p.m.</p> <p>5 (Off the record at 12:23 p.m.)</p> <p>6 VIDEOGRAPHER: We are back on</p> <p>7 the record at 12:24 p.m.</p> <p>8 QUESTIONS BY MS. BRANSCOME:</p> <p>9 Q. As you sit here today, how</p> <p>10 would you characterize the biological</p> <p>11 mechanism by which you claim Johnson's baby</p> <p>12 powder, their other cosmetic talc products,</p> <p>13 present a risk of ovarian cancer?</p> <p>14 A. So I outline this for you in</p> <p>15 the MDL report. I think I have a section</p> <p>16 on -- let's see if I can -- you want me to</p> <p>17 tell you where or...</p> <p>18 So paragraph 65, I think I set</p> <p>19 out part of this argument or part of this.</p> <p>20 And then also in paragraph -- I believe in</p> <p>21 67.</p> <p>22 Q. All right. Well, let me take a</p> <p>23 step back.</p> <p>24 Is it your opinion that the</p> <p>25 biological mechanism by which talc, cosmetic</p>
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<p>1 or use of the products. In other</p> <p>2 words, people aren't just using it</p> <p>3 once, but people are using it -- you</p> <p>4 can use the word "routinely," as a</p> <p>5 habit, in their daily life perineally.</p> <p>6 And that would be consistent with the</p> <p>7 studies that have been done that have</p> <p>8 looked at the issue of dose response.</p> <p>9 And I discuss that in my</p> <p>10 report, too.</p> <p>11 QUESTIONS BY MS. BRANSCOME:</p> <p>12 Q. Okay. But you have not made an</p> <p>13 attempt to quantify, nor have you seen it in</p> <p>14 the literature, the overall dose of talc that</p> <p>15 someone might be exposed to in terms of</p> <p>16 contact with the ovaries throughout their</p> <p>17 lifetime, chronic use of cosmetic talc?</p> <p>18 MS. PARFITT: Objection. Form.</p> <p>19 THE WITNESS: Those -- that's</p> <p>20 the kinds of studies that have not</p> <p>21 been done and I believe could not be</p> <p>22 done based upon ethics of human</p> <p>23 testing. But certainly I -- that --</p> <p>24 that data is not available that I'm</p> <p>25 aware of.</p>	<p>1 talc, can in your view cause ovarian cancer,</p> <p>2 is that something that has been definitively</p> <p>3 established?</p> <p>4 A. What do you mean by</p> <p>5 definitively? I mean, I think -- I believe</p> <p>6 more likely than not that -- so I believe I</p> <p>7 have reached a conclusion that I think what</p> <p>8 the most likely biologically plausible</p> <p>9 mechanism, but maybe you're ask -- meaning</p> <p>10 something else.</p> <p>11 Q. Okay. Well, let's start with</p> <p>12 specifically you discuss a number of</p> <p>13 different potential mechanisms in your</p> <p>14 report. So if you believe you have reached</p> <p>15 an opinion more likely than not about the</p> <p>16 specific biological mechanism by which</p> <p>17 cosmetic talc and specifically Johnson &</p> <p>18 Johnson's products can cause ovarian cancer,</p> <p>19 can you describe that for me?</p> <p>20 A. So it's a chronic inflammatory</p> <p>21 process, and so -- but like all compounds,</p> <p>22 constituents, even drugs that we look at, we</p> <p>23 don't know each individual step within the</p> <p>24 molecular mechanism.</p> <p>25 Instead, what we know is that</p>

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<p>1 there are certain components to the process 2 of cancer that are consistent with the 3 effects produced by talc, and we know that 4 talc can produce a chronic inflammatory 5 process. 6 And so that's why I was 7 pointing you to the paragraph 65 and I think 8 67. 9 Q. Is it your opinion that 10 consensus has been reached in the scientific 11 community that cosmetic talc can cause 12 ovarian cancer through a chronic inflammatory 13 response? 14 MS. PARFITT: Objection. 15 THE WITNESS: I don't know that 16 that's exactly the opinion I've 17 formed. 18 Would you like me to -- I could 19 restate what I believe, but I don't 20 think that's exactly how I would state 21 it, no. 22 QUESTIONS BY MS. BRANSCOME: 23 Q. Okay. So then yes or no: Has 24 consensus been reached in the scientific 25 community that cosmetic talc can cause</p>	<p>1 discuss those issues. 2 I think it's consistent with -- 3 I don't know if the ACOG statement goes that 4 far on mechanism, but it does talk about 5 ovarian cancer. That's a recent statement. 6 And I believe it's consistent 7 with some of the -- I believe my opinions are 8 consistent with some of the opinions reached 9 by others in science, but that's the only way 10 I can answer that for you. 11 Q. Okay. Because you have not, 12 one way or the other, done an evaluation of 13 whether or not chronic inflammatory process 14 is a biological mechanism on which the 15 scientific community has reached general 16 consensus with respect to the causation of 17 ovarian cancer; is that correct? 18 MR. MEADOWS: Objection. 19 THE WITNESS: I can't tell you 20 that -- I can't tell you that every 21 body that's looked at it, but I have 22 tried to point you to evidence that I 23 believe is consistent with that. 24 For example, the IARC would be 25 a good example of consensus on</p>
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<p>1 ovarian cancer through a chronic inflammatory 2 process? 3 A. I don't believe I formed the 4 opinion either way, that it's yes or no, 5 because I haven't tried to -- I haven't tried 6 to form the opinion about what the -- in 7 other words, I haven't -- I can't say for 8 every scientist out there. 9 I certainly can tell you what I 10 believe based on what the consensus of 11 science says about mechanisms underlying 12 cancer and the consistency of those 13 mechanisms with talc, and then I have an 14 opinion about what I believe that information 15 says. 16 I do believe my opinions, 17 however, are consistent with some consensus 18 statements, such as the issue on the 19 mechanism is consistent with consensus 20 opinion reached by IARC, where they discuss 21 the inflammatory process as an underlying 22 biologically plausible mechanism that can 23 lead to ovarian cancer. 24 I think it's consistent with 25 the Canadian risk assessment where they</p>	<p>1 biologic mechanism because they have a 2 whole part of their assessment of 3 non-asbestiform talc and perineal 4 cancer -- of perineal use and ovarian 5 cancer that discusses mechanism. And 6 that is consistent with what I have 7 said. So there is a consensus 8 opinion. 9 But I guess what I'm saying to 10 you is I can't tell you that all -- 11 all people who have put statements 12 have come to that exact opinion. But 13 there aren't that many places out 14 there that are addressing that issue 15 as far as the consensus on a 16 mechanism. There's more statements 17 about the relationship between ovarian 18 cancer and talc use than there are 19 drilling down to what the mechanism 20 must be. 21 QUESTIONS BY MS. BRANSCOME: 22 Q. Okay. 23 A. So that's the issue. It's a 24 little -- it's a little hard to answer that 25 yes or no because of that.</p>

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<p>1 Q. Okay. When we talk about the 2 idea of biologic -- a biologically plausible 3 mechanism, what is your understanding of the 4 term "plausible" in that expression? 5 A. When I use the word 6 "biologically plausible mechanism" or 7 "biologic plausibility," I'm using it 8 consistent with what Bradford Hill uses, 9 that's it's the idea that the evidence that 10 available makes -- the evidence that 11 available supports a pathway where you can go 12 to exposure to response. 13 So in other words, there's a -- 14 the biological information is consistent with 15 how we know cancer can develop. That's the 16 response we're looking at. And the exposure 17 we're looking at is known to produce those 18 kind of biologic events. 19 So as a result, based upon 20 knowing that there's a consistency between 21 the data that we have on the -- on the 22 exposure and the data that we have on the way 23 cancer can occur, those things -- those 24 things align. So that makes it biologically 25 plausible that that could occur.</p>	<p>1 are known to be able to produce, 2 specifically, ovarian cancer. 3 QUESTIONS BY MS. BRANSCOME: 4 Q. Is it your opinion that IARC, 5 for example, has concluded that the 6 biological mechanism by which talc may cause 7 ovarian cancer is chronic inflammation? 8 MS. PARFITT: Objection. 9 THE WITNESS: I don't know that 10 they have used -- they've described it 11 quite that way, but they do describe 12 what they believe is the biologically 13 plausible mechanism. Because they do 14 organize and use within the 15 definitions of how they describe some 16 things that are consistent with what 17 Bradford Hill uses. 18 QUESTIONS BY MS. BRANSCOME: 19 Q. Okay. And obviously you're 20 familiar with the IARC evaluation of talc 21 with respect to the possibility of causing 22 ovarian cancer, correct? 23 A. Yeah. If you mean the recent 24 one, yes, the most recent assessment. 25 Q. Yes.</p>
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<p>1 Q. But you would agree that 2 biological plausibility suggests that it is a 3 plausible explanation, but it may not have 4 been established as the definitive pathway by 5 which a disease is caused, correct? 6 MS. PARFITT: Objection. Form. 7 THE WITNESS: Well, I would 8 agree that in the discussion of 9 biologic plausibility in the Bradford 10 Hill paper that is true. But if you 11 look at people's discussion of the use 12 of -- I want to say "biological 13 mechanism" rather than the word 14 "biologic plausibility," because 15 really as a toxicologist I'm trying to 16 understand whether there's a biologic 17 mechanism that makes sense. Those are 18 words I like to use. Does it make 19 sense that this exposure could lead to 20 this response. 21 And that involved looking at 22 the mechanistic data or the data on 23 the way toxic responses are produced 24 by talc, and whether or not they align 25 with the types of toxic insults that</p>	<p>1 And that IARC has in fact 2 classified cosmetic talc not containing 3 asbestos as possibly carcinogenic to humans, 4 correct? 5 A. It's a possible human 6 carcinogen 2B, that's correct. 7 Q. Okay. And if a product is 8 listed in the 2B category, does that 9 necessarily mean the product, in your view, 10 is carcinogenic? 11 A. Not always, because that comes 12 down to an assessment of -- then you're 13 putting together a -- a risk assessment that 14 looks at -- looks at -- across the 15 information that you have available. And 16 that may be that -- that the -- the possible 17 is all you can say, or it may be that you 18 believe that the information -- there's 19 enough information there to take it further. 20 Has a possibility -- that's 21 what I said, they do a hazard assessment. 22 They rank things on hazard based on -- on 23 unlikely -- not enough evidence, less -- the 24 possibility, the probability or it's known. 25 Q. In your opinion, is your</p>

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<p>1 characterization of the risk of Johnson's 2 baby powder or talcum powder products with 3 respect to ovarian cancer, are you in the MDL 4 characterizing that risk as a higher level of 5 risk than what IARC characterized it, or do 6 you agree with the 2B characterization of 7 possibly carcinogenic? 8 MS. PARFITT: Objection. Form. 9 THE WITNESS: So I'm not IARC, 10 so I don't try to second-guess there. 11 They have reached a conclusion, and I 12 use that as part of my weight of the 13 evidence. So I haven't formed the 14 opinion they're right or wrong. 15 But I have done a different 16 assessment. My assessment, first off, 17 includes more information than IARC 18 had, so as a result, I have formed the 19 conclusion that I believe that it's 20 more likely than not that exposure 21 to -- perineal exposure to talc body 22 powders increases the risk of ovarian 23 cancer in women who use that product. 24 And I will put the caveat this 25 has to be chronic use or repeated use,</p>	<p>1 opinion. 2 Q. Is there a threshold of the use 3 of Johnson & Johnson's talcum powder products 4 below which there is no increased risk, in 5 your opinion, of ovarian cancer? 6 A. We have not identified that 7 threshold. That's what's missing within 8 the -- the literature that exists today. So 9 I can't tell you whether or not with only a 10 thousand applications over a lifetime that 11 is -- is not enough for every individual or 12 not, but certainly I do believe that the -- 13 that the exposure has to be habit, routine, 14 chronic, something that is done maybe not on 15 a daily basis but on a routine basis in a 16 woman's life. 17 So that is consistent, I think, 18 with the literature. 19 MS. BRANSCOME: Okay. We can 20 go off the record. 21 VIDEOGRAPHER: We are going off 22 the record at 12:36 p.m. 23 (Off the record at 12:36 p.m.) 24 VIDEOGRAPHER: We are back on 25 the record at 1:35 p.m.</p>
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<p>1 because I've gone -- I've said that 2 many times. 3 So that -- that is my opinion. 4 So that's a different statement and a 5 different assessment than what IARC 6 does. 7 But -- so I don't disagree with 8 their possible -- I weigh that, but I 9 believe the evidence for the risk 10 assessment shows me that it's more 11 likely than not that this -- this 12 exposure will increase the risk above 13 a background risk for women who are 14 using this product. 15 QUESTIONS BY MS. BRANSCOME: 16 Q. And how do you define chronic 17 or repeated use? 18 A. Well, that is variable within 19 the literature. For me, chronic is 20 exposure -- if as a toxicologist, I would 21 typically say chronic use is years of use. 22 It doesn't have to be daily, but it would be 23 years. That's the most common description 24 you see in toxicology, so I would say that's 25 fair. That's a fair assessment of my</p>	<p>1 QUESTIONS BY MS. BRANSCOME: 2 Q. Good afternoon again, 3 Dr. Plunkett. 4 A. Good afternoon. 5 Q. I want to talk a little bit 6 about the Health Canada assessment. 7 We talked about this before, 8 but this is something that you reviewed after 9 you completed your report which has been 10 marked as Exhibit 4, correct? 11 A. Yes, and I wanted to tell you, 12 I did not bring all those documents printed. 13 I apologize. So there is a separate Health 14 Canada draft risk assessment that I didn't 15 print. 16 Q. Okay. So when you're referring 17 to the Health Canada analysis, what document 18 are you specifically referring to? 19 A. So I'm referring to the -- the 20 combined documents, but there are times when 21 you've asked me questions that I've been 22 referring -- and I tried to say, I believe, 23 Taher. 24 But, yes, some of the questions 25 you asked me when I said Health Canada, I was</p>

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<p>1 talking about the combined documents, which</p> <p>2 would include their -- I guess it's called a</p> <p>3 draft risk assessment document, yeah, which</p> <p>4 refers to this document but is a separate --</p> <p>5 is their own separate statement.</p> <p>6 Q. As you sit here today, what is</p> <p>7 your understanding of the current position</p> <p>8 that has been articulated in the collection</p> <p>9 of documents that you refer to as Health</p> <p>10 Canada with respect to any potential</p> <p>11 relationship between cosmetic talc and</p> <p>12 ovarian cancer?</p> <p>13 A. So that's why I did print out</p> <p>14 the small one, because I think it summarized</p> <p>15 it. So here, if you look at this Exhibit 6,</p> <p>16 it makes specific conclusions or draws --</p> <p>17 makes statements. And essentially it talks</p> <p>18 about talc being a possible risk of ovarian</p> <p>19 cancer, but then it gives women specific</p> <p>20 advice about what to do in order to minimize</p> <p>21 exposure to the products, and some of that</p> <p>22 was relevant as well.</p> <p>23 Just one reason I printed it</p> <p>24 out, it has to do with either choosing an</p> <p>25 alternative product or avoiding genital</p>	<p>1 there is a association between those two</p> <p>2 things, the exposure and the response, which</p> <p>3 is more than a possible association, if you</p> <p>4 want to use those words.</p> <p>5 But my assessment that I've</p> <p>6 done is not exactly the same, for example, as</p> <p>7 IARC does, which is more of just a hazard</p> <p>8 assessment.</p> <p>9 Q. Right.</p> <p>10 So I'm focusing my questions</p> <p>11 now on your risk assessment as compared to</p> <p>12 the documents that you've supplied us with</p> <p>13 with respect to Health Canada. And if I</p> <p>14 understand it correctly, are you stating that</p> <p>15 your opinion with respect to the relationship</p> <p>16 between cosmetic talc and ovarian cancer, you</p> <p>17 believe that it is an association that is</p> <p>18 stronger than a possible risk; is that</p> <p>19 correct?</p> <p>20 A. Well, I don't say it's a</p> <p>21 possible risk; I say there is an increased</p> <p>22 risk. So I think it's a different statement,</p> <p>23 yes, absolutely.</p> <p>24 Of course, I'm not Health</p> <p>25 Canada, so, you know, they have a framework</p>
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<p>1 exposure to talc.</p> <p>2 And let me see the exact words</p> <p>3 that they use, but --</p> <p>4 Q. Before you do that, do you</p> <p>5 agree with the characterization that cosmetic</p> <p>6 talc presents a possible risk of ovarian</p> <p>7 cancer?</p> <p>8 A. No, I don't think that's my</p> <p>9 opinion. I think my opinion is stronger than</p> <p>10 that.</p> <p>11 But are you talking about my</p> <p>12 causation analysis opinion or just my risk</p> <p>13 assessment opinion?</p> <p>14 Q. I'm asking about any opinion</p> <p>15 you intend to offer in the MDL.</p> <p>16 A. Okay. So I will not be giving</p> <p>17 the causation analysis opinion, so that -- I</p> <p>18 will take that off the table.</p> <p>19 So I think my opinion is a</p> <p>20 little stronger because I say that the</p> <p>21 exposure to the perineal -- the talc by</p> <p>22 perineal application in women increases the</p> <p>23 risk. So I'm not saying it's a possible</p> <p>24 risk. I'm actually -- I believe that it</p> <p>25 increases the risk. And I do believe that</p>	<p>1 upon which they make decisions, and I'm doing</p> <p>2 an analysis based on what I have done. And</p> <p>3 so it's not exactly the same, although some</p> <p>4 of the same documents and information is</p> <p>5 weighed within -- and then that's when you</p> <p>6 have the issue of what Health Canada does</p> <p>7 versus what they rely upon.</p> <p>8 But this Taher risk assessment</p> <p>9 is just one piece of information that Health</p> <p>10 Canada has weighed in their assessment if you</p> <p>11 read their -- their draft risk assessment.</p> <p>12 Q. So the question I have about</p> <p>13 the Taher risk assessment, earlier you were</p> <p>14 referring to the fact that you have only seen</p> <p>15 a quantitative assessment of the weight of</p> <p>16 particular components of scientific evidence</p> <p>17 in evaluating epidemiological studies; is</p> <p>18 that correct?</p> <p>19 A. So that's what I typically see,</p> <p>20 yes. And I don't know that -- I've never</p> <p>21 seen it. But the typical approach would be</p> <p>22 to use it there as opposed to using it in the</p> <p>23 context of a human health risk assessment</p> <p>24 based on animal in vitro data.</p> <p>25 Q. All right. Are you familiar</p>

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<p>1 with something called the Klimisch scoring 2 system? 3 A. I don't know if I am now. 4 You'll need to show me what it is you're 5 referring to. The name doesn't ring a bell, 6 no. 7 Q. Okay. So it's not something 8 that you've used in the past? 9 A. No, not that I recall using. 10 Q. All right. 11 A. Unless it has another name, and 12 that's why I'm asking you. 13 Q. All right. So if you have 14 actually -- it's the document in front of you 15 that we've already marked as Deposition 16 Exhibit 5, I believe. 17 A. Yes. 18 Q. And that is the Taher study 19 that we were discussing and is cited by the 20 Health Canada risk assessment. 21 If you turn to page 5 -- well, 22 actually beginning on page 4, do you see 23 there is a section entitled "Literature 24 Search and Identification of Relevant 25 Nonhuman Studies"?</p>	<p>1 So, yes, if they stated they've 2 done -- we'd have to pull the supplementary 3 materials out, but I recall them doing 4 scoring based on epi studies but not on 5 the -- all of the animal studies that they 6 talk about. But we can pull it out and look. 7 I could be wrong. 8 Q. Okay. Did you review the 9 supplementary material 7, 8 and 9? 10 A. Yes, I did, and we'd have to 11 pull them out because I don't recall the 12 details. 13 Q. All right. We may take a look 14 at those in a minute. 15 It talks about them classifying 16 the animal and in vitro studies into four 17 categories of reliability. 18 Do you see that? 19 A. Yes. 20 Q. So did you make any attempt, 21 when you were reviewing the various studies 22 in reaching your opinion about the potential 23 risk of talc in causing ovarian cancer, did 24 you make any attempt to separate out the 25 different pieces of evidence into categories</p>
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<p>1 Do you see that? 2 A. Yes. 3 Q. And this is related to an 4 analysis that these authors performed on 5 potentially relevant animal and in vitro 6 studies, correct? 7 A. Yes, that is true. 8 Q. All right. And it states here 9 that "all retrieved studies were examined for 10 relevance, reliability and overall quality 11 using the Klimisch scoring system." 12 Do you see that? 13 A. Yes, I do see that. So I have 14 seen that before. I just didn't -- I didn't 15 recall it. 16 Q. Okay. And so would you agree 17 that it is possible and in fact has been done 18 in a study that you rely on to apply a 19 quantitative scoring system to animal and in 20 vitro studies, particularly in the context of 21 looking at the relationship between talc and 22 ovarian cancer? 23 A. Well, I didn't say it was 24 impossible. I said I don't believe it's 25 routine based on my experience.</p>	<p>1 of reliability like the authors of this paper 2 have done? 3 A. I didn't do it exactly the way 4 they did it, but I certainly do do that as 5 part of my screening. 6 I told you one of the 7 characteristics or one of the assessments I 8 make is whether I believe the data is 9 reliable data that I can -- that I can use in 10 a weight of the evidence. So I make a -- and 11 when I talk about reliability, I'm talking 12 then about things such as I mentioned, peer 13 review, whether or not there is statistical 14 analysis, whether or not the study is 15 designed in a way that's consistent with 16 general principles of toxicology, control 17 groups or not control groups. 18 Those kinds of things I do -- I 19 do consider when I am assessing the use of a 20 study or not. 21 Q. Is it your testimony here today 22 that contained within your report that's 23 marked as Exhibit 4, I could find 24 categorization of reliability of each of the 25 pieces of scientific literature that you have</p>

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<p>1 included in your weight of the evidence 2 analysis? Is that your testimony today? 3 A. No, that's not what I'm telling 4 you, no. 5 Q. Okay. So you would agree that 6 you did not -- first of all, did you develop 7 categories of reliability in which you 8 separated the particular scientific studies 9 into as part of your weight of the evidence 10 analysis? 11 A. I do look at -- I do categorize 12 studies based upon my assessment of their 13 reliability and their ability to be used to 14 answer the question I'm asking, but I -- I 15 already told you, I didn't do it the way it's 16 set out here. I didn't have these specific 17 five categories, no. That's not what I did. 18 Q. Okay. Other than the CIR 2013 19 publication, which you have said that you do 20 not find reliable and you assign little 21 weight to it, can you point me to another 22 place in Exhibit 4 where you assign a 23 specific category of weight that you have 24 given to a particular study that you include 25 in your weight of the evidence analysis?</p>	<p>1 reliance list? 2 A. I believe it was, yes. 3 Q. Okay. And so for this one I 4 just want to direct your attention to the 5 conclusion section -- well, let me ask you 6 first: How does this document relate to the 7 collection of documents with respect to 8 Health Canada that you identified as relevant 9 to your opinion? 10 A. It was one of the materials 11 that they rely upon or they cite. That's the 12 reason I pulled it. It was -- I pulled 13 documents that they provided on the website 14 that were cited. 15 Q. Okay. And if you could turn to 16 page 11 of that document, there's a 17 conclusion section. The first sentence of 18 the third paragraph reads, "The given -- 19 given the context-specific nature of each 20 risk assessment and the diversity of tools 21 and criteria applicable, transparent 22 documentation of the specific application of 23 the WOE approach is especially important." 24 Did I read that correctly? 25 A. Yes, you did.</p>
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<p>1 A. If what you're asking me is do 2 I make a specific statement next to each 3 study that I discuss about little weight or 4 great weight, no, I don't do that, if that's 5 what you're asking me. 6 Q. Okay. As part of the 7 collection of documents that relate to Health 8 Canada that was provided to us as part of 9 your new reliance list, did you review a 10 document entitled weight of the evidence -- 11 or "Weight of evidence: General principles 12 and current applications of Health Canada"? 13 A. Yes, I've seen that. 14 (Plunkett Exhibit 8 marked for 15 identification.) 16 QUESTIONS BY MS. BRANSCOME: 17 Q. All right. We will mark this 18 as Plunkett Deposition Exhibit Number 8. 19 All right. The document that I 20 just handed you that's marked as Plunkett 21 Deposition Exhibit Number 8, are you familiar 22 with that document, Dr. Plunkett? 23 A. Yep, I've seen this before. 24 Q. Is this listed among the new 25 materials that have been added to your</p>	<p>1 Q. And is your understanding of 2 WOE that it is weight of evidence? 3 A. Yes, that's correct. 4 Q. Do you agree with this 5 statement? 6 A. In a regulatory context, I do 7 believe that that is true, because within the 8 regulatory context when they do the risk 9 assessment, there's a need to understand why 10 decisions are made. So, absolutely, in a 11 regulatory context, I would agree that this 12 kind of transparency is even being adopted by 13 EPA. 14 Q. And is it your opinion then 15 that a different level of transparency is 16 needed for expert testimony in court? 17 A. No, that's not what I'm saying. 18 I'm saying that's a different process. And 19 that's what part of this process is. It's 20 understanding the ability to provide a dialog 21 about what was done. 22 So as a result, this is 23 something that is common to the work that 24 I've done in the past. Even in a 25 nonlitigation context with my regulatory</p>

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<p>1 clients, doing a risk assessment doesn't</p> <p>2 necessarily involve the same level of detail</p> <p>3 that a regulatory -- a regulator would apply</p> <p>4 to the transparency of the assessment. Not</p> <p>5 to say that it couldn't be done, but it's</p> <p>6 just -- I would say it's not necessarily</p> <p>7 typical.</p> <p>8 Q. So this specifically refers to</p> <p>9 transparent documentation.</p> <p>10 Do you see that?</p> <p>11 A. Yes.</p> <p>12 Q. Would you agree that the report</p> <p>13 that you have produced in the MDL does not</p> <p>14 have documentation of the specific</p> <p>15 application of the weight of evidence</p> <p>16 approach?</p> <p>17 MS. PARFITT: Objection.</p> <p>18 Excuse me, objection. Form.</p> <p>19 THE WITNESS: I disagree to an</p> <p>20 extent because I did attempt to</p> <p>21 provide in my report a description of</p> <p>22 the methods that I used and the</p> <p>23 resources that I've relied upon for a</p> <p>24 discussion of how those methods are</p> <p>25 used.</p>	<p>1 study. In other words, as I discussed many</p> <p>2 times in deposition, when you're talking</p> <p>3 about doing a human health risk assessment,</p> <p>4 there's certain types of data that are most</p> <p>5 relevant. I mean, when they use the word</p> <p>6 "reliable" -- I don't know that many of these</p> <p>7 studies have the same level of reliability as</p> <p>8 far as peer review, but they're -- for</p> <p>9 example, on the issue of migration, it's my</p> <p>10 opinion that the data from the human studies</p> <p>11 is a more reliable or relevant source of</p> <p>12 information. And I've laid out why, because</p> <p>13 of differences in the anatomy, things like</p> <p>14 that, with the data.</p> <p>15 Q. Are you familiar with the term</p> <p>16 "binning exercise"?</p> <p>17 A. Yes, I am. And that is</p> <p>18 certainly something that I have used in other</p> <p>19 aspects of work that I have done.</p> <p>20 Q. Did you do a binning exercise</p> <p>21 in rendering your opinions and what you've</p> <p>22 provided to us in the context of your</p> <p>23 opinions in the MDL?</p> <p>24 A. Yes, that's the exercise I</p> <p>25 start with. I'm binning them into human,</p>
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<p>1 And then in addition to that,</p> <p>2 I've attempted to lay out for you in</p> <p>3 my report a discussion of the pieces</p> <p>4 of evidence that I've relied upon,</p> <p>5 including some -- for some of those --</p> <p>6 that's one of the reasons I got so</p> <p>7 detailed in the section on migration</p> <p>8 and providing you an analysis of each</p> <p>9 of the papers that I relied upon and</p> <p>10 what I thought was important within</p> <p>11 them that led to my -- the formation</p> <p>12 of my opinions.</p> <p>13 So I disagree to some extent.</p> <p>14 QUESTIONS BY MS. BRANSCOME:</p> <p>15 Q. Okay. Turning back to what</p> <p>16 Taher did in classifying different studies</p> <p>17 into different categories of reliability.</p> <p>18 Have you done that type of analysis in the</p> <p>19 past where you have separated out different</p> <p>20 studies into different categories of weight</p> <p>21 or reliability as part of an overall</p> <p>22 analysis?</p> <p>23 A. Well, I do that every time I do</p> <p>24 a weight of the evidence when I separate into</p> <p>25 categories first based upon the type of</p>	<p>1 animal, mechanistic, in vitro data. That's</p> <p>2 the first bins.</p> <p>3 In fact, in the copper work we</p> <p>4 did, that's what we did. We separated the</p> <p>5 data into in vitro/only mechanistic</p> <p>6 information, animal studies, did we have</p> <p>7 human studies.</p> <p>8 And we also looked at</p> <p>9 studies -- we had a separate bin of exposures</p> <p>10 like I do. I have studies that just address</p> <p>11 the issue of exposure potentially.</p> <p>12 So, yes, it's -- it's</p> <p>13 consistent with doing that. It's --</p> <p>14 essentially binning is just separating the</p> <p>15 information into groups based on what</p> <p>16 questions those -- those data can answer.</p> <p>17 Q. Okay. Have you ever -- do you</p> <p>18 ever separate them into bins based on the</p> <p>19 level of weight that you would give a</p> <p>20 particular study?</p> <p>21 A. I do that when I'm analyzing</p> <p>22 each of the studies within that group or that</p> <p>23 bin. That's what I do. I give them -- in my</p> <p>24 weight -- in my analysis, I weigh those</p> <p>25 studies based upon my judgment on the</p>

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<p>1 relevance, the reliability, the power of the</p> <p>2 study, the statistical analysis that's done,</p> <p>3 the inclusion in animal studies, in</p> <p>4 particular, of controls. Those are all parts</p> <p>5 of that analysis that I do. So, yes, I do do</p> <p>6 that.</p> <p>7 And then in -- there have been</p> <p>8 exercises that I've done in the past with</p> <p>9 other individuals where we may have taken a</p> <p>10 yellow sticky note and put down on top of it</p> <p>11 animal data with exposure information, animal</p> <p>12 data without exposure information. That's</p> <p>13 the process that I'm doing when I am looking</p> <p>14 across the data. I'm separating those pieces</p> <p>15 of data into groups and what types of</p> <p>16 questions they can answer.</p> <p>17 So that is consistent with what</p> <p>18 I do when I do a weight of analysis approach</p> <p>19 in the work that I do in both nonlitigation</p> <p>20 and litigation context.</p> <p>21 Q. Okay. But we have no specific</p> <p>22 documentation of the different ratings that</p> <p>23 you gave the various pieces of evidence that</p> <p>24 you included in your weight of the evidence</p> <p>25 analysis, aside from occasional references to</p>	<p>1 inflammation, cause ovarian cancer?</p> <p>2 A. Because it doesn't change the</p> <p>3 phenotype of the cell. It has to -- the --</p> <p>4 and I discuss that. You have to -- you have</p> <p>5 to set up a chronic inflammatory process that</p> <p>6 leads to changes within the cellular</p> <p>7 phenotype to go from a cell that is -- that</p> <p>8 is -- is dividing normally to a cell that</p> <p>9 isn't.</p> <p>10 So it's -- it's the same issue</p> <p>11 that you address even in a study in animals.</p> <p>12 Why do not all animals exposed to -- exposed</p> <p>13 to a chemical develop tumors. It's the idea</p> <p>14 that something has to be initiated beyond the</p> <p>15 exposure or maybe beyond inflammation to lead</p> <p>16 to the series of events.</p> <p>17 And so, yes, it's recognized</p> <p>18 that you can get inflammation, and</p> <p>19 inflammation can go down the road in becoming</p> <p>20 a carcinogenic process, or inflammation can</p> <p>21 no longer -- can stay where it is. It</p> <p>22 doesn't progress beyond just a chronic</p> <p>23 inflammatory process.</p> <p>24 Q. And so if you had a study that</p> <p>25 demonstrated that a particular agent causes</p>
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<p>1 giving something less or more weight,</p> <p>2 correct?</p> <p>3 A. Well, I certainly -- I told you</p> <p>4 I have not given numerical values that you're</p> <p>5 asking me, but I've attempted to do that when</p> <p>6 I have described them in groups, when I talk</p> <p>7 about human versus animal versus in vitro.</p> <p>8 Because I've already told you, I believe,</p> <p>9 it's my opinion that certain types of</p> <p>10 information are more informative than others.</p> <p>11 And so the more informative it is, the more</p> <p>12 weight you're giving it in -- obviously in</p> <p>13 your analysis.</p> <p>14 But it is a different exercise</p> <p>15 than what is described here. And here I'm</p> <p>16 pointing to Exhibit 8. And it's a different</p> <p>17 exercise, obviously, than what a regulatory</p> <p>18 body is required to do where they are trying</p> <p>19 to come up with ways to increase the</p> <p>20 transparency when no one can go and actually</p> <p>21 talk to each of the regulators individually</p> <p>22 to understand what their thinking was.</p> <p>23 Q. Okay. Returning to biological</p> <p>24 mechanism for a minute, why doesn't</p> <p>25 inflammation generally, including chronic</p>	<p>1 inflammation, you would need more information</p> <p>2 in order to make the conclusion that that</p> <p>3 agent can in fact cause cancer, correct?</p> <p>4 MR. MEADOWS: Objection.</p> <p>5 THE WITNESS: You would look</p> <p>6 for more informative information,</p> <p>7 exactly, which is why, when I've</p> <p>8 talked about the individual</p> <p>9 constituents in the context of</p> <p>10 consistency on mechanism for cancer,</p> <p>11 I've pointed to documents where that</p> <p>12 information has been discussed.</p> <p>13 So like when I talk about</p> <p>14 asbestos or cobalt or I point to</p> <p>15 the -- for example, the IARC</p> <p>16 assessment where they go through</p> <p>17 that -- that discussion of the fact</p> <p>18 that there's not just data showing</p> <p>19 that a biologically plausible</p> <p>20 mechanism may be inflammation, but</p> <p>21 there's also data to show that that</p> <p>22 can lead to tumor development as well.</p> <p>23 QUESTIONS BY MS. BRANSCOME:</p> <p>24 Q. Okay. How does talc change the</p> <p>25 phenotype of the ovarian cell?</p>

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<p>1 A. So this is one of the details 2 we don't know, other than generally it's 3 changing the phenotype to go from a normal 4 cell to a tumor cell. That is being 5 observed. When you find the presence of the 6 tumor, that is what you're observing. 7 Q. Does pure talc with no other 8 constituent components, can it change the 9 phenotype of an ovarian cell? 10 MR. MEADOWS: Objection. 11 THE WITNESS: So that's a 12 difficult question to answer with 13 certainty because of the fact that I 14 don't believe that we have assurance 15 that any of the studies are done with 16 essentially pure talc. 17 However, in the studies that 18 claim to have been done with pure 19 talc -- for example, the NTP study 20 claims to have been done with pure 21 talc. So if that is pure talc, truly 22 is, then that study is an example of 23 evidence for the chronic inflammatory 24 process leading to preneoplastic 25 lesions that are setting down the road</p>	<p>1 in vitro or an animal experiment -- by which 2 you would expose either cells or animal to 3 talc with different constituent products to 4 identify or separate out the individual 5 effects of the components? Is that a study 6 that you could design as a toxicologist? 7 A. I think that would be difficult 8 to do, but I'm not saying impossible to do. 9 And here's the -- there are some very 10 specific considerations you'd have to put 11 into that design. 12 I would argue that some of that 13 is already available, where we have studies 14 that have looked at the dose-response effects 15 for toxicity with cobalt, with chromium, with 16 asbestos. 17 When you get to asbestos and 18 talc, it's more problematic because then the 19 question is what is -- what is it? What are 20 the specific characteristics in all the 21 different studies of exactly what the 22 asbestos was versus exactly what the talc 23 was. 24 But I think you could attempt 25 to do that, and then the question would be,</p>
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<p>1 mechanism towards cancer. 2 So there are data out there. 3 The problem you have, I believe, in 4 the literature is whether or not, 5 based on the discussion that is 6 becoming apparent now with sensitivity 7 and ability to take the natural 8 product and actually determine exactly 9 what's in it, that I don't think there 10 is the ability to assure that any -- 11 any of these studies with the samples 12 of talc they're using is absolutely, 13 100 percent, only platy talc. I think 14 there's -- there's some concern about 15 that. But certainly you will take -- 16 you have to take what is discussed 17 within the study as evidence from what 18 they're claiming. 19 So many of the studies say we 20 used asbestos-free talc or platy -- 21 pure platy talc and we got a toxic 22 response. 23 QUESTIONS BY MS. BRANSCOME: 24 Q. Would it be possible to design 25 an experiment -- and now I'm talking about an</p>	<p>1 being able to use that data not so much to -- 2 not so much to identify a dose response for a 3 certain insult, but to look at the fact -- 4 look at potency differences across the 5 compounds. And then there's the issue of 6 then looking at additivity when you know you 7 have a complex mixture. 8 So that could be done, but, 9 again, it would be difficult to do based on 10 what we know about talc, being able to really 11 know that -- you would have to really be very 12 careful that what it is that you're looking 13 at is -- is not containing any of those 14 things that we unfortunately know co-occur 15 with constituents within the natural product. 16 But no one has done those 17 studies. I point that out. I haven't seen 18 that study that you're asking for. I have 19 not seen somebody do that. 20 Q. And a study like that would be 21 relevant in evaluating the potency of the 22 individual constituents and what might 23 actually be the driving factor for phenotypic 24 change, correct? 25 A. Not necessarily. I would argue</p>

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<p>1 that we already have an answer to that by</p> <p>2 looking at the data that's been collected on</p> <p>3 the complex mixture itself. So the issue</p> <p>4 would be why -- the question is what do you</p> <p>5 gain by being able to say that we're only</p> <p>6 pointing to this constituent or that</p> <p>7 constituent. That isn't what is occurring.</p> <p>8 What people are exposed to is</p> <p>9 the complex mixture, not just each one of</p> <p>10 those individual components. To me this is</p> <p>11 not a case of asbestos-only exposure. This</p> <p>12 is a case of exposure to consumer products</p> <p>13 that are talc that may have within them at</p> <p>14 any given time -- and data indicates that</p> <p>15 there are substantial chance that asbestos</p> <p>16 may be in -- is in certain of these products.</p> <p>17 But my opinions are not</p> <p>18 dependent on there being asbestos there at a</p> <p>19 particular level or copper there -- or, I'm</p> <p>20 sorry, cobalt there at a particular level</p> <p>21 because my opinions are based on the</p> <p>22 observations we have on the complex product</p> <p>23 as it exists.</p> <p>24 Q. And you recognize that</p> <p>25 different types of talc and different talc</p>	<p>1 been linked to an inflammatory response.</p> <p>2 Oxidative stress is often a triggering</p> <p>3 mechanism.</p> <p>4 Q. Does the body have protective</p> <p>5 mechanisms that limit tissue damage from</p> <p>6 oxidative stress?</p> <p>7 A. Yes, which is why not everybody</p> <p>8 that's exposed to any particular chemical is</p> <p>9 going to get cancer. Some people will</p> <p>10 respond better. Some cells will respond</p> <p>11 better. Some individuals in a population at</p> <p>12 one time in their life may respond better.</p> <p>13 Q. You would agree that in vitro</p> <p>14 studies do not account for the body's natural</p> <p>15 defenses outside of what exists at the</p> <p>16 cellular level, correct?</p> <p>17 A. Depends on the in vitro study</p> <p>18 that's being done and whether or not there is</p> <p>19 components added.</p> <p>20 So I've seen studies done where</p> <p>21 they take cells and then add extra levels of</p> <p>22 glutathione to try to protect the cells from</p> <p>23 certain stressors that could lead to damage,</p> <p>24 but I agree with you that an isolated cell on</p> <p>25 its own is a different microenvironment than</p>
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<p>1 products have different constituent</p> <p>2 components in different amounts, correct?</p> <p>3 A. Some can. I agree with that.</p> <p>4 That is true.</p> <p>5 So if you're being broad, as in</p> <p>6 pharmaceutical-grade versus industrial-grade</p> <p>7 or chemical-grade, yeah, because they'll have</p> <p>8 a purity level assigned.</p> <p>9 But as far as what the -- what</p> <p>10 the components are, it isn't always defined</p> <p>11 even specifically within that.</p> <p>12 Q. Okay. And does the presence of</p> <p>13 oxidative stress in a tissue indicate that</p> <p>14 cancer will develop in that tissue?</p> <p>15 A. Will definitively develop?</p> <p>16 Not -- I don't think you could say</p> <p>17 definitively develop, but it's certainly in</p> <p>18 the biologically plausible mechanism that's</p> <p>19 been understood to lead to chronic</p> <p>20 inflammation and also has been linked to</p> <p>21 cancer.</p> <p>22 So that's the issue of not</p> <p>23 necessarily saying it has to be there, but it</p> <p>24 certainly is something that is observed</p> <p>25 routinely in cases where carcinogenesis has</p>	<p>1 an intact tissue, which is a different</p> <p>2 environment than an intact animal, which is</p> <p>3 even different than an intact human being.</p> <p>4 Yes, they're all -- you look at those levels</p> <p>5 of evidence or those types of evidence</p> <p>6 differently, depending upon the end points</p> <p>7 you're collecting.</p> <p>8 Q. And so you would give lower</p> <p>9 weight to an in vitro study as compared to an</p> <p>10 in vivo study, for example?</p> <p>11 A. Depends on the question you're</p> <p>12 asking. I would give a lot of weight if the</p> <p>13 question is what do I know -- if I want to</p> <p>14 try to understand the biologically plausible</p> <p>15 mechanism, some of those in vitro studies are</p> <p>16 some of the most important, because it's the</p> <p>17 only ones that allow us to answer a question.</p> <p>18 If the question is higher level</p> <p>19 about what is the evidence to show that</p> <p>20 there's an increased risk overall for cancer</p> <p>21 or a hazard for cancer, then certainly you</p> <p>22 need to have more than an in vitro study.</p> <p>23 So as -- so on -- if you want</p> <p>24 to layer it up, obviously, if all you had was</p> <p>25 in vitro data, you'd have much less</p>

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<p>1 confidence in the conclusions you can draw</p> <p>2 unless you had some in vivo data. In vivo</p> <p>3 data is going to allow you to interpret the</p> <p>4 in vitro data.</p> <p>5 So certainly there would be</p> <p>6 more weight given in that assessment to the</p> <p>7 fact that you had in vivo data.</p> <p>8 Q. And so when you made the</p> <p>9 statement that, for instance, you always give</p> <p>10 more weight to human data, is that true, or</p> <p>11 does that also depend?</p> <p>12 A. Well, it depends on whether you</p> <p>13 have human data. So if I have human data and</p> <p>14 I have a doubt, any doubts at all, about</p> <p>15 whether or not the exposure-response</p> <p>16 relationship would be affected by the way the</p> <p>17 animal studies are designed, then, yes, I</p> <p>18 would give more weight to the human studies.</p> <p>19 In a case, however, such as</p> <p>20 inhalation exposure assessments where</p> <p>21 there -- it's much better, actually, to do an</p> <p>22 animal study where we can do a dose response</p> <p>23 across different sizes of particles and</p> <p>24 actually observe lesions as they develop over</p> <p>25 time, which is why I love -- I love the NTP</p>	<p>1 weight, but it could if you only had one</p> <p>2 crappy human study, one really badly designed</p> <p>3 human study, and I had a GLP quality cancer</p> <p>4 bioassay then, absolutely. I mean, IARC does</p> <p>5 this. They look at that animal data and say,</p> <p>6 "This one tells us -- answers the questions</p> <p>7 we want to answer, and this very poorly</p> <p>8 designed case series isn't going to allow us</p> <p>9 to do that."</p> <p>10 So you could, but I would say</p> <p>11 it's more the other issue, that you look at</p> <p>12 animal and human more on an equal basis if</p> <p>13 the relevance and the extrapolation can be</p> <p>14 done reliably.</p> <p>15 And that's the question you</p> <p>16 have to ask, can I extrapolate from animals</p> <p>17 to humans in a reliable manner.</p> <p>18 Q. Okay. Would you agree that the</p> <p>19 response to cosmetic talc can vary depending</p> <p>20 on tissue type in the body?</p> <p>21 A. Yes, I would say that that is</p> <p>22 true, whether or not there's certain</p> <p>23 protective barriers in place, for example,</p> <p>24 yes.</p> <p>25 Q. And so in order to draw</p>
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<p>1 93 study of interim sacrifices, looking at</p> <p>2 that issue. That data is very reliable in</p> <p>3 order to understand the risk of lung damage</p> <p>4 as compared to a human study where we don't</p> <p>5 have those serial time points, doses that are</p> <p>6 defined tightly.</p> <p>7 So -- and the relevance between</p> <p>8 those kinds of initial lung injury in certain</p> <p>9 animals versus humans match fairly well.</p> <p>10 That's my problem, though, in</p> <p>11 the case with the perineal exposure. I'm</p> <p>12 saying to you, because of the route of</p> <p>13 contact -- we need to be able to get it there</p> <p>14 to the tissue -- the human data is extremely</p> <p>15 important.</p> <p>16 Q. So is it fair to say that in</p> <p>17 some circumstances animal data gets more</p> <p>18 weight than human data and in other</p> <p>19 circumstances human data gets more weight</p> <p>20 than animal data? It is circumstance</p> <p>21 dependent?</p> <p>22 A. I would put it a different way.</p> <p>23 I would say in some cases animal data is</p> <p>24 weighted in a similar manner to human data.</p> <p>25 I don't necessarily say it would get more</p>	<p>1 conclusions based on a study of one cell</p> <p>2 type's reaction to cosmetic talc to another,</p> <p>3 you would need to understand the differences</p> <p>4 in similarities between those two cell types,</p> <p>5 correct?</p> <p>6 MS. PARFITT: Objection.</p> <p>7 THE WITNESS: It's a different</p> <p>8 question. So you were asking me</p> <p>9 about -- I didn't think you were just</p> <p>10 asking about cells. I thought you</p> <p>11 were asking me about like routes of</p> <p>12 exposure, dermal versus inhalation.</p> <p>13 Those things differ.</p> <p>14 Cell types may or may not.</p> <p>15 That may or may not be true. Because</p> <p>16 if two cells -- two different cell</p> <p>17 types in the body share similar</p> <p>18 characteristics as far as the -- for</p> <p>19 example, if they're both epithelial</p> <p>20 cells or mesothelial cells, those type</p> <p>21 of cells you would expect to respond</p> <p>22 the same way.</p> <p>23 But I would agree that, for</p> <p>24 example, a neuronal cell versus a GI</p> <p>25 cell versus a liver cell, there could</p>

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<p>1 be differences in how they would</p> <p>2 respond, yes, and so you would -- you</p> <p>3 would look at those things</p> <p>4 individually.</p> <p>5 QUESTIONS BY MS. BRANSCOME:</p> <p>6 Q. And so it's important to</p> <p>7 understand the differences and the</p> <p>8 similarities between the different cell types</p> <p>9 before drawing conclusions using studies from</p> <p>10 different cell types?</p> <p>11 MS. PARFITT: Objection.</p> <p>12 MR. MEADOWS: Objection.</p> <p>13 THE WITNESS: I certainly think</p> <p>14 you should consider the cell types</p> <p>15 that are being used and whether or not</p> <p>16 those cell types are ones that are</p> <p>17 relevant to your risk assessment</p> <p>18 question you're asking, yes.</p> <p>19 QUESTIONS BY MS. BRANSCOME:</p> <p>20 Q. Okay. You would agree as a</p> <p>21 toxicologist, dose is an important part of a</p> <p>22 toxicological analysis of an agent, correct?</p> <p>23 A. If you're doing risk, yes. If</p> <p>24 you're only doing hazard, it may not be as</p> <p>25 important. It depends upon the question</p>	<p>1 Q. Okay. And in your -- in your</p> <p>2 report, as part of your risk assessment that</p> <p>3 you did in the MDL -- this is paragraph 12 on</p> <p>4 page 8.</p> <p>5 A. Yes, I'm there.</p> <p>6 Q. Okay. You state about</p> <p>7 two-thirds of the way down the paragraph that</p> <p>8 "weight of the evidence methods were critical</p> <p>9 to defining the literature that identified</p> <p>10 the hazards of talc exposure as well as</p> <p>11 defining the dose-response relationship</p> <p>12 between talc exposure and the risk of adverse</p> <p>13 health effects."</p> <p>14 Did I read that correctly?</p> <p>15 A. You did. That's correct.</p> <p>16 Q. All right. Is it your view</p> <p>17 that in the case you have reached an opinion</p> <p>18 that defines the dose-response relationship</p> <p>19 between talc exposure and the risk of ovarian</p> <p>20 cancer?</p> <p>21 A. It depends what you mean by</p> <p>22 define. I can tell you what I mean in this</p> <p>23 sentence, and maybe that would help you.</p> <p>24 Q. Dr. Plunkett, it is your</p> <p>25 report. And so I am asking you, using your</p>
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<p>1 you're asking about hazard.</p> <p>2 Do you want me to explain?</p> <p>3 Q. I do want you to explain the</p> <p>4 difference between a risk analysis and a</p> <p>5 hazard analysis.</p> <p>6 A. Okay. So in an initial hazard</p> <p>7 analysis, if the question is, is there a</p> <p>8 hazard associated with exposure, let's say,</p> <p>9 by inhalation, it may not matter whether it</p> <p>10 was a high dose or a low dose study. Both of</p> <p>11 those can identify hazard.</p> <p>12 Then you ask the question: Is</p> <p>13 there a dose-response relationship? That's</p> <p>14 the next step beyond hazard.</p> <p>15 So hazard is -- to me is</p> <p>16 identifying the end points that you're going</p> <p>17 to monitor for toxicity, sort of the target</p> <p>18 organs, those things, and so whether or not</p> <p>19 there's a dose-response study available, it</p> <p>20 wouldn't be as important.</p> <p>21 But certainly when you go to</p> <p>22 that next step to assess risk, you'd like to</p> <p>23 be able to see whether or not there is a</p> <p>24 dose-response relationship in the effect that</p> <p>25 you're assessing.</p>	<p>1 own definition of "define," have you rendered</p> <p>2 an opinion that defines the dose-response</p> <p>3 relationship between talc exposure and the</p> <p>4 risk of ovarian cancer?</p> <p>5 A. I have formed opinions about</p> <p>6 the dose-response relationship generally, but</p> <p>7 unfortunately -- I answered that question for</p> <p>8 you earlier when you asked me, I think, about</p> <p>9 is there -- I don't know if you used the word</p> <p>10 "threshold," but I did.</p> <p>11 So the available information</p> <p>12 doesn't allow us to identify an ultimate</p> <p>13 threshold, for example, in the case of women</p> <p>14 exposed to talc perineally and their -- and</p> <p>15 their development of ovarian cancer.</p> <p>16 Instead, in defining the dose</p> <p>17 response, what we can do with the data -- and</p> <p>18 that is what I attempted to do. This is</p> <p>19 where you look at defining the dose response</p> <p>20 in the animal studies, which we can look at,</p> <p>21 or defining dose response in cell studies,</p> <p>22 showing that as the dose increases, the</p> <p>23 hazard and the risk increase. So risk</p> <p>24 actually you quantify. There's a certain</p> <p>25 response at this dose and a different</p>

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<p>1 response at the next dose, or have we 2 plateaued, that the responses are the same as 3 dose increases. 4 So that, I did do that as part 5 of my assessment, trying to define the dose 6 as far as how that linked to the responses in 7 each of the studies I looked at. 8 Q. You would agree, though, that 9 some studies did not show a dose relationship 10 between talc and ovarian cancer or the 11 clinical signs that were indicative of the 12 potential for development into ovarian 13 cancer, correct? 14 MS. PARFITT: Objection. 15 THE WITNESS: If you're talking 16 about the human data; is that what 17 you're referring to? Or are you 18 talking about all -- any of the data? 19 QUESTIONS BY MS. BRANSCOME: 20 Q. Any of the data. 21 A. So I would disagree on the 22 animal data. I think on the animal data they 23 often -- most of the animal studies I've 24 relied upon have looked at more than one dose 25 or at least looked a no exposure versus a</p>	<p>1 or -- that they may make a -- an 2 author may make a statement, but I'm 3 talking about looking -- this is 4 weight of the evidence. I'm looking 5 across. And I'm saying, across the 6 data, when I look at the human data 7 versus the animal data, for example, 8 versus in vitro studies, the in vitro 9 studies and the animal studies allow 10 you to look at dose response for talc 11 toxicity. 12 The -- even the animal studies 13 allow you to look at dose response for 14 development of precancerous lesions, 15 you're on the way to cancer, for 16 example, in the NTP studies. 17 And then in the human studies, 18 some of those studies are designed 19 such that the authors could draw 20 conclusions about dose response and 21 some are not. 22 Even in some of the studies 23 where they attempted to look at dose 24 response, some of the authors indicate 25 they don't see an effect. So that is</p>
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<p>1 dose, and most of them have looked at more 2 than one dose. 3 In the case of the human 4 studies, unfortunately, some of those studies 5 were not designed to be able to define dose. 6 In other words, the questions weren't asked, 7 for example, of the individuals even in the 8 prospective studies. Some of those 9 included -- did not include the information 10 collected on frequency and duration of use. 11 So if it's not collected, 12 obviously, I don't have it to look at. And 13 that's one of the limitations of human 14 epidemiological investigations, is that it 15 often is not designed appropriately to look 16 at dose response. 17 Q. Is it your opinion that there 18 are no studies looking at talc and the risk 19 of ovarian cancer in which the authors of the 20 study have concluded there was no clear 21 pattern of increased risk with dose? 22 MS. PARFITT: Objection. 23 THE WITNESS: No, that's not 24 what I've said. No. It's very 25 possible that an individual paper</p>	<p>1 true. And part of that may be driven 2 by the design of the study, the number 3 of individuals in the study, the way 4 that the questions were asked. 5 There's limitations on the way that 6 information is collected. 7 If you want to look at each 8 study, we can, but -- 9 QUESTIONS BY MS. BRANSCOME: 10 Q. So my question to you, whether 11 you agree or disagree with the author's 12 conclusion, is simply that if you look at the 13 overall animal and human studies that you 14 cite in your report or have considered on 15 your reliance list that look at a potential 16 dose-response relationship for talc toxicity, 17 do some of those studies conclude that there 18 is not a dose-response relationship? 19 MS. PARFITT: Objection. 20 THE WITNESS: I disagree for 21 talc toxicity, but I would say if 22 you're going to limit it to the issue 23 of the ovarian cancer response, I 24 would agree. I have seen that in some 25 of the studies.</p>

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<p>1 I think talc toxicity, I don't</p> <p>2 know if anybody has made the</p> <p>3 comment -- I would doubt it -- that</p> <p>4 there is no dose response for toxic</p> <p>5 effects of talc.</p> <p>6 QUESTIONS BY MS. BRANSCOME:</p> <p>7 Q. Okay. You discuss in your</p> <p>8 report -- wait a moment. It's in</p> <p>9 paragraph 58 on page 38. And I just want to</p> <p>10 make sure I understood what you were citing</p> <p>11 here.</p> <p>12 In paragraph 58 you state that</p> <p>13 "It is important to remember that</p> <p>14 administration of even a single dose of talc</p> <p>15 in animals has been shown to produce adverse</p> <p>16 effects locally at the site of the exposure."</p> <p>17 What are you referring to</p> <p>18 there?</p> <p>19 A. Acute doses. In other words,</p> <p>20 in studies that have described installation</p> <p>21 of a single dose of talc in some form into a</p> <p>22 tissue, that they are observing adverse</p> <p>23 responses.</p> <p>24 An example of that may be</p> <p>25 the -- I think it's Hamilton. Is that the</p>	<p>1 is that you give them less weight because you</p> <p>2 believe that the individuals who conducted</p> <p>3 the study had been paid by either a company</p> <p>4 or agencies that had some investment in the</p> <p>5 outcome of the study; is that correct?</p> <p>6 A. Is that my opinion?</p> <p>7 Q. Yes.</p> <p>8 A. For any particular study,</p> <p>9 you'll need to show me what you're pointing</p> <p>10 to. I do have opinions about some of the</p> <p>11 work by Drs. Huncharek and Muscat, yes. I</p> <p>12 think I address that specifically, and that</p> <p>13 has -- that's not so much to do with my</p> <p>14 weight of the evidence; that has more to do</p> <p>15 with transparency and what was being</p> <p>16 disseminated to the public and disseminated</p> <p>17 to the FDA as far as evaluations.</p> <p>18 That's a different issue than</p> <p>19 the weight of -- the weight of -- the weight</p> <p>20 of the evidence assessment for risk. I think</p> <p>21 those were separate.</p> <p>22 Q. So then I'll ask you that.</p> <p>23 In doing your weight of the</p> <p>24 evidence analysis for risk, have you</p> <p>25 discounted the weight that you've given to</p>
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<p>1 one where they stilled it into the ovaries</p> <p>2 with a single dose?</p> <p>3 Q. So these are large-dose</p> <p>4 exposures?</p> <p>5 A. Well, not all --</p> <p>6 Q. Or are they, I should say?</p> <p>7 A. I don't know that they all are,</p> <p>8 no. There are -- there are -- I don't think</p> <p>9 I have attempted to quantify large in this</p> <p>10 sentence.</p> <p>11 What I'm stating here is not an</p> <p>12 issue of large versus small. It's an issue</p> <p>13 of the fact that there are toxic effects with</p> <p>14 single exposures. And I'm just making the</p> <p>15 comment -- this has to do with hazard, right?</p> <p>16 It's the idea even a single dose -- or a</p> <p>17 single exposure you can get irritant,</p> <p>18 inflammatory reactions at the site of</p> <p>19 exposure. And that's all I'm trying to say.</p> <p>20 That's why I'm citing as reviewed by EPA. I</p> <p>21 believe EPA even makes a very similar</p> <p>22 statement.</p> <p>23 Q. Okay. Do you take into</p> <p>24 account -- there are some studies for</p> <p>25 which -- at least my reading of your report</p>	<p>1 any particular piece of scientific evidence</p> <p>2 based off of potential affiliations of the</p> <p>3 authors?</p> <p>4 A. I certainly did with the CIR</p> <p>5 review document. I've already told you that.</p> <p>6 And that's because I have evidence that shows</p> <p>7 it's not just an affiliation issue, but it's</p> <p>8 actually -- it's more -- it's more important</p> <p>9 than that.</p> <p>10 Q. Are there any other examples?</p> <p>11 A. I think that's the only one</p> <p>12 right now as I sit here that I can tell you</p> <p>13 that I had identified as carrying little</p> <p>14 weight because of an issue of either</p> <p>15 authorship or input in the way it was</p> <p>16 described.</p> <p>17 There are certainly studies</p> <p>18 within my weight of the evidence evaluation,</p> <p>19 some of which were performed by industry. I</p> <p>20 certainly look at that issue, but unless I</p> <p>21 have -- have a reason to believe that there's</p> <p>22 an inherent bias based on something I know,</p> <p>23 they go into the weight of the evidence</p> <p>24 without making a correction for that.</p> <p>25 In many cases that I work in</p>

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<p>1 litigation, I will find situations like the</p> <p>2 situation here with Huncharek and Muscat</p> <p>3 where I have, for example -- I think this</p> <p>4 came up in the Risperdal litigation for me.</p> <p>5 It's the idea that there was a series of</p> <p>6 papers put out by an individual investigator</p> <p>7 where documents that I could get access to</p> <p>8 show me that indeed their analysis was not</p> <p>9 done by them but it was ghostwritten by</p> <p>10 somebody else. So that gives me pause,</p> <p>11 although I would never have known that unless</p> <p>12 I had access to internal documents.</p> <p>13 So initial weight of the</p> <p>14 evidence I did not discount it, but then I</p> <p>15 went back and had to reevaluate the role</p> <p>16 those studies played in my overall</p> <p>17 assessment.</p> <p>18 Q. Do you take into account in any</p> <p>19 way in evaluating the weight of a study if it</p> <p>20 is conducted by someone who serves as an</p> <p>21 expert on behalf of the plaintiffs in the</p> <p>22 active litigation?</p> <p>23 A. It would be the same -- same</p> <p>24 issue. I certainly consider it as part of</p> <p>25 what I look at, but just like if they were an</p>	<p>1 tested, that he reports are Johnson's baby</p> <p>2 powder, did you also consider the work that</p> <p>3 was done by experts that have been retained</p> <p>4 on behalf of the defendants to characterize</p> <p>5 the components of Johnson's baby powder? Do</p> <p>6 you give them equal weight?</p> <p>7 A. So I haven't seen a variety of</p> <p>8 the documents that you're talking about,</p> <p>9 so -- because I have not worked in the</p> <p>10 litigation cases that have involved asbestos</p> <p>11 only. So -- which I think is where those</p> <p>12 documents are.</p> <p>13 In the litigation I -- in the</p> <p>14 litigation I worked in, I am aware of what</p> <p>15 other experts on both sides have said. I</p> <p>16 don't believe I've seen an analysis from a</p> <p>17 defense expert that is -- that is like</p> <p>18 Dr. Longo's, at least in the litigation I've</p> <p>19 worked in. Certainly I would consider that</p> <p>20 and look at that if it's available, and I</p> <p>21 would consider it.</p> <p>22 I would point out, Dr. Longo's</p> <p>23 analysis is not the piece of evidence that</p> <p>24 you start with, though. You start with what</p> <p>25 I discuss in the published literature first,</p>
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<p>1 expert for the defense versus an expert for</p> <p>2 the plaintiff, you judge that information</p> <p>3 based on what you know. And if I don't have</p> <p>4 information to discount it, I will not</p> <p>5 discount it.</p> <p>6 But absolutely, I understand.</p> <p>7 Just as people we all -- look at some of the</p> <p>8 things I've published where I have said my</p> <p>9 work was sponsored by the American Chemistry</p> <p>10 Council. You know, people -- that's why you</p> <p>11 disclose the conflicts. You put it there so</p> <p>12 people can weigh it if they want, but it</p> <p>13 doesn't mean you discount the work</p> <p>14 automatically.</p> <p>15 And so I think for any paper,</p> <p>16 plaintiff, defense, whoever it is that's</p> <p>17 writing it, you need to consider it based on</p> <p>18 the information you have. And if you believe</p> <p>19 that you have information to indicate that</p> <p>20 there's some issue with the reliability of</p> <p>21 the analysis, then absolutely you consider</p> <p>22 that.</p> <p>23 Q. So, for example, when you rely</p> <p>24 on Dr. Longo's characterization of the</p> <p>25 constituent components in samples that he has</p>	<p>1 because there are published documents out</p> <p>2 there in the literature that describe exactly</p> <p>3 what Dr. Longo is now describing.</p> <p>4 Q. What published documents are</p> <p>5 those?</p> <p>6 A. Those are Dr. Blount's reports</p> <p>7 in 1991, which is before the litigation came</p> <p>8 about, is my understanding.</p> <p>9 There's also -- there's five or</p> <p>10 six. I can tell you the paragraph.</p> <p>11 Q. For Johnson's baby powder, I</p> <p>12 would be interested in that, yes.</p> <p>13 A. So I -- I'll have to look and</p> <p>14 see if it's Johnson's baby powder only, but</p> <p>15 certainly there is other evidence on the</p> <p>16 issue of asbestos contamination and</p> <p>17 specifically in talc.</p> <p>18 So I -- you want me to find the</p> <p>19 paragraph for you?</p> <p>20 Q. Please. If you think there is</p> <p>21 published literature documenting asbestos in</p> <p>22 Johnson's baby powder, I would like to see</p> <p>23 that.</p> <p>24 A. So this is my paragraph 32.</p> <p>25 And I'd have to pull each of these articles</p>

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<p>1 out because I don't recall what each of them</p> <p>2 says. But I'm pointing to Paoletti, Blount,</p> <p>3 Mattenklott, Moon, Gordon, Anderson, Rohl,</p> <p>4 Pooley and Rowlands, Blejer and Arlon,</p> <p>5 Cralley, Millman.</p> <p>6 And then I cite -- and then of</p> <p>7 course the next piece of evidence is there</p> <p>8 are actually documents from J&J and Imerys</p> <p>9 that show detection of asbestos or</p> <p>10 asbestos-like minerals in talc.</p> <p>11 Q. As you sit here today, can you</p> <p>12 identify which of these published articles</p> <p>13 that you list in paragraph 32 relate to</p> <p>14 Johnson's baby powder?</p> <p>15 A. I would have to pull them to</p> <p>16 answer that.</p> <p>17 Q. Okay.</p> <p>18 A. As I sit here, I'd have to pull</p> <p>19 them. But I would refer you -- I know at</p> <p>20 least some of them do based on the statement</p> <p>21 I've made, but...</p> <p>22 Q. So you did not make an attempt</p> <p>23 in this paper to identify which products were</p> <p>24 being analyzed in these specific articles.</p> <p>25 It's not indicated on the face of this</p>	<p>1 look.</p> <p>2 Q. Have you reviewed Dr. Blount's</p> <p>3 deposition?</p> <p>4 A. I have reviewed a -- something</p> <p>5 by Dr. Blount. Whether it was trial</p> <p>6 testimony or deposition, I have seen</p> <p>7 something, yes, that she has said regarding</p> <p>8 this issue.</p> <p>9 Q. To the extent that there is</p> <p>10 confusion about whether or not a sample</p> <p>11 tested by Dr. Blount is in fact Johnson's</p> <p>12 baby powder, would you reduce the weight that</p> <p>13 you give that particular piece of evidence in</p> <p>14 evaluating whether asbestos has been present</p> <p>15 in Johnson's baby powder?</p> <p>16 MS. PARFITT: Objection. Form.</p> <p>17 MR. MEADOWS: Objection.</p> <p>18 THE WITNESS: I don't know</p> <p>19 reduce the weight because -- because</p> <p>20 there's -- there are plenty of</p> <p>21 documents here that talk about that.</p> <p>22 I would consider it --</p> <p>23 certainly it would -- it's not so much</p> <p>24 weight. It's a different bin. We'll</p> <p>25 call it a bin, a different bin of</p>
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<p>1 paragraph, correct?</p> <p>2 A. I don't tell you on the face,</p> <p>3 but you if read the sentence I said, "When</p> <p>4 commercially available, talcum powder</p> <p>5 products were analyzed, including powders</p> <p>6 sold by Johnson & Johnson. The data has</p> <p>7 shown that the powders contained varied</p> <p>8 levels" -- and I'm saying "fibers," so it's</p> <p>9 just asbestos -- "including fibers that</p> <p>10 stated to be asbestos."</p> <p>11 So to tell you which of those,</p> <p>12 I'd have to pull them. And I apologize, I</p> <p>13 didn't bring them all with me.</p> <p>14 Q. Have you been provided --</p> <p>15 you're aware that Dr. Blount's paper does not</p> <p>16 identify Johnson's baby powder in the face of</p> <p>17 the article, correct?</p> <p>18 A. I believe that's true. You'd</p> <p>19 have to go to her deposition, I believe,</p> <p>20 where she's given -- where she discusses what</p> <p>21 the source of that was, and maybe even a --</p> <p>22 there may even be a separate document,</p> <p>23 actually, not a deposition, that was -- that</p> <p>24 was in the files of Johnson & Johnson that</p> <p>25 goes along with that, but I'd have to go</p>	<p>1 information. There's information on</p> <p>2 talc powders generally, and then</p> <p>3 there's some information that's</p> <p>4 specific to certain body powders.</p> <p>5 So certainly -- would I pay</p> <p>6 attention if they identified it? Yes.</p> <p>7 But in the statement I'm making</p> <p>8 here, I'm not claiming that every one</p> <p>9 of these is relating to just the</p> <p>10 powder sold by Johnson & Johnson.</p> <p>11 This is across the available</p> <p>12 information that's public and then</p> <p>13 also the information that's available</p> <p>14 in the files of Johnson & Johnson.</p> <p>15 QUESTIONS BY MS. BRANSCOME:</p> <p>16 Q. What is your definition of</p> <p>17 asbestos?</p> <p>18 A. My definition of asbestos is</p> <p>19 exactly what the different documents describe</p> <p>20 it typically. It's a fibrous mineral,</p> <p>21 typically. It occurs in a variety of</p> <p>22 different forms. Most of the times they'll</p> <p>23 say "asbestos." Sometimes they'll say</p> <p>24 "chrysotile." Sometimes they'll say</p> <p>25 "tremolite." Sometimes they'll say</p>

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<p>1 "anthophyllite." Those are the three most 2 common ones I see. But those are all mineral 3 forms of asbestos. 4 So just like IARC puts those 5 all within one bin, I'm putting those all in 6 one bin because they have a similar toxicity 7 profile. 8 Q. Is it your view that each of 9 the different types of asbestos has the same 10 toxicity profile? 11 A. They all have the same ability 12 to cause cancer, but they have different 13 potencies. So they do have -- there will be 14 some differences in the dose response and the 15 potency of them, but certainly they've all 16 been linked as being carcinogens by IARC. 17 And I would agree, when you 18 look at their data, there is data and 19 evidence to indicate that. 20 Q. Which type of asbestos is the 21 most potent? 22 A. For which end point? For lung 23 cancer? I believe chrysotile is. For other 24 end points, I'd have to go look. I mean, 25 chrysotile is the sharp -- is the sharp --</p>	<p>1 A. Has to do with the fact that we 2 have a complex mixture that has multiple 3 carcinogenic substances. 4 And asbestos is important from 5 the aspect of the way that it has been 6 assessed even by regulatory bodies, the idea 7 that even very low levels of fibers pose a 8 cancer hazard and a cancer risk in 9 individuals have been shown to be 10 carcinogenic. 11 So that's what I'm saying about 12 potency of asbestos is different than potency 13 of some other carcinogens that you might look 14 at. But the importance of it is it's a 15 complex mixture, talc, body powders, a 16 complex mixture that includes constituents 17 that are known human carcinogens as well as 18 some that are -- been ranked other ways by 19 regulatory bodies. 20 Q. If Johnson's talcum powder 21 products do not contain asbestos, does that 22 change your opinion with respect to the risk 23 they pose with respect to ovarian cancer? 24 A. No, and I think that was very 25 clear if you looked at my first report. So</p>
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<p>1 the sharded-type structure. 2 But there's data on fibrous -- 3 the fiber -- the fibrous forms of asbestos 4 rather than the -- or the amphibole forms of 5 asbestos as opposed to chrysotile, which is 6 the serpentine form. 7 Q. Do you consider yourself an 8 expert in asbestos? 9 A. Not in -- 10 MS. PARFITT: Objection. 11 THE WITNESS: Not the geology 12 of asbestos, no. 13 I have expertise in toxicology 14 as it relates to interpretation of the 15 data related to asbestos. I have 16 never give -- given testimony in a 17 case on asbestos, but it's something 18 I've studied in the past in my work as 19 a toxicologist, not as a testifying 20 expert. 21 QUESTIONS BY MS. BRANSCOME: 22 Q. What role does your analysis of 23 the possibility that there may be asbestos in 24 Johnson's talcum powder products play in your 25 risk assessment in the MDL?</p>	<p>1 even -- there's -- I don't think in any of my 2 reports I've opined that without looking at 3 the complex mixture that we wouldn't be here. 4 In other words, I have not 5 opined that if it doesn't have -- if it 6 doesn't have asbestos, it's not a risk. I 7 have not opined that, and I don't believe 8 that, because I think there is independent 9 risk for the fact that we have a complex 10 mixture of talc that has been tested and 11 shown to be carcinogenic. 12 It's my opinion, I told you -- 13 maybe it wasn't you. I may have told this 14 yesterday, I'm sorry, to Mr. Smith that I 15 believe that there is evidence to show that 16 there is a significant exposure to asbestos 17 based on the data that's been collected. 18 But certainly, you know, in 19 some -- the data has shown that in the assays 20 that have been done or the analyses that have 21 been done that you can't say that talc is 22 asbestos-free. 23 Q. Well, so -- 24 A. So -- 25 Q. -- the question I have</p>

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<p>1 specifically relates to ovarian cancer. 2 Is it your view that through an 3 exposure route that is relevant for ovarian 4 cancer, that the use of Johnson's talcum 5 products involve a substantial exposure to 6 asbestos? 7 A. I believe based on the use of 8 the products that -- where the data has been 9 collected that there would be a substantial 10 exposure to asbestos, regardless of how 11 you're exposed, perineal -- perineally or by 12 inhalation. 13 Q. What is your basis for reaching 14 that conclusion? 15 A. It's looking at the number of 16 fibers that have been detected in the 17 products, in looking at the -- the widespread 18 nature of the presence of asbestos fiber -- 19 asbestos in the talcum powder products and 20 the fact that even though it's at a very low 21 level by their -- their level of detection, 22 again, can't be said to be asbestos-free. 23 So regardless of whether it's 24 talc that's being applied perineally or a 25 talc that you're inhaling while you're</p>	<p>1 asbestos above background through the 2 perineal use of Johnson's talcum powder 3 products? 4 MR. MEADOWS: Objection. 5 MS. PARFITT: Objection. 6 THE WITNESS: I don't think 7 that's the opinion I have formed to 8 date, but certainly the opinion I have 9 formed is that the data I have seen 10 indicates that you can't separate out 11 talc without asbestos versus talc with 12 asbestos in the information that's 13 been collected. Because there's -- 14 all -- the information that's been 15 collected has shown there's no 16 evidence that asbestos-free talc is 17 available. 18 If by asking that question 19 you're trying to say that it's the 20 asbestos alone that's causing the 21 cancer, that is not my opinion. So 22 that is when the dose issue would 23 become very important for asbestos. 24 QUESTIONS BY MS. BRANSCOME: 25 Q. Okay.</p>
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<p>1 applying it perineally, the fibers are still 2 going to be present within that talc. 3 Q. Have you or anyone done an 4 analysis of the dose of asbestos to which 5 someone might be exposed perineally? 6 A. I haven't done a specific 7 calculation, no. 8 Q. Has anyone done that 9 calculation? 10 MS. PARFITT: Objection. Form. 11 QUESTIONS BY MS. BRANSCOME: 12 Q. That you have seen? 13 MS. PARFITT: Objection. 14 THE WITNESS: I'm trying to 15 remember whether I saw that done in 16 any of the documents related to 17 Dr. Longo. 18 I don't know. I'd have to go 19 look. 20 QUESTIONS BY MS. BRANSCOME: 21 Q. Okay. So as you sit here 22 today, can you give an opinion to a 23 scientific degree of certainty, reasonable 24 degree of scientific certainty, that an 25 individual would be exposed to a dose of</p>	<p>1 A. So that's -- so that's a 2 different question I have not answered. 3 Q. And in reaching your opinion 4 that there is no evidence that asbestos-free 5 talc exists, you have not been provided with 6 the reports by the defense experts, including 7 Dr. Matthew Sanchez, analyzing Johnson's 8 talcum powder products for the presence or 9 absence of asbestos, correct? 10 MS. PARFITT: Objection. Form. 11 I think you're aware that the 12 MDL expert reports have not yet been 13 provided to us. 14 MS. BRANSCOME: Yeah. 15 MS. PARFITT: I'm just making a 16 point. 17 THE WITNESS: I have not seen a 18 report by Dr. Sanchez. I assume I 19 will, because typically after -- later 20 in the litigation, once all experts 21 have been deposed or revealed, I'm 22 usually given defense expert reports 23 and their deposition testimony. So I 24 expect to see that; I just haven't 25 seen it yet.</p>

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<p>1 QUESTIONS BY MS. BRANSCOME: 2 Q. And you haven't seen it in any 3 of the cases in which you've rendered an 4 opinion, correct, not just the MDL? 5 A. Well, none of the cases that I 6 have worked in have involved the issue of 7 looking for asbestos exposure. 8 The cases I have worked on have 9 been talking about talc exposure that may 10 include asbestos as a constituent, but it 11 wasn't focused on asbestos exposure. 12 So, no, none of the cases I 13 worked on have provided testimony in that 14 area. 15 You understand what I'm saying? 16 Q. Let me just make it clear. You 17 have not, in any of the cases in which you 18 have offered opinions with respect to the 19 contents of talc, been provided with an 20 expert report or testimony by Dr. Sanchez 21 about what he did or did not find in 22 Johnson's talcum powder products with respect 23 to asbestos? 24 MS. PARFITT: Objection. Form. 25 THE WITNESS: So I can't tell</p>	<p>1 application for any of the heavy metals. So 2 the three that I've mentioned, no, I have not 3 done that calculation. 4 Q. You would agree, based on your 5 training and experience as a toxicologist, 6 that in order for an agent -- and we can talk 7 specifically about a metal -- to present a 8 risk of cancer it needs to be bioaccessible, 9 correct? 10 A. If by bioaccessible you are not 11 limiting that definition to solubilized into 12 the blood and carried systematically, yes, I 13 would agree with that. Bioaccessible meaning 14 it has to be in a form that can somehow 15 interact with the tissue, yes, I agree with 16 that. But it could be as simple as tissue 17 contact versus needing to be solubilized. 18 Q. Okay. Is silica bioaccessible? 19 A. It depends on the form of the 20 silica. So silica particles can be 21 bioaccessible if inhaled and found on the 22 surface of the lung. That can cause injury 23 at the site of the lung. So that's an 24 accessibility to that particular tissue that 25 it contacts.</p>
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<p>1 you that I have not. I don't recall 2 it. That's all I can say. I don't 3 recall that name. 4 QUESTIONS BY MS. BRANSCOME: 5 Q. It's certainly not something 6 you discuss in your report, correct? 7 A. No, I do not. And I don't know 8 that it's in my reliance materials. That's 9 why I'd ask you to look there, because if 10 it's in my reliance materials, then I've seen 11 it. 12 Q. Okay. 13 A. And I mean big reliance 14 material list, not my reference list. 15 Q. All right. With respect to the 16 other potential constituents of talc, have 17 you done any analysis to provide an answer as 18 to how much -- what dose of chromium, for 19 example, an individual might be exposed to 20 through the perineal use of Johnson's talcum 21 powder products over a lifetime? 22 A. No, and I have -- well, I know 23 it's a separate deposition. We discussed 24 this yesterday. No, I have not done a -- a 25 calculation of a potential dose with perineal</p>	<p>1 Q. We talked earlier -- it's 2 somewhat related to bioaccessibility, but we 3 talked about the way in which different 4 particles might move specifically through the 5 genital tract in women. 6 Do you recall that? 7 A. Yes. A general discussion. 8 Q. Yes. 9 And when you testified that 10 starch and talc might not move at the same 11 rate, do you have an opinion as to which 12 might move more quickly through the tract? 13 A. I haven't formed that opinion, 14 no. 15 Q. Okay. And do both talc and 16 starch particles remain in the body for the 17 same length of time? 18 A. I haven't done an analysis to 19 see if the data tells us what the -- what the 20 differences might be. I would expect there 21 to be differences, which is what I told you 22 earlier, because I would expect the starch to 23 be able to be solubilized, where I would not 24 necessarily expect the talc to act in that 25 same manner.</p>

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<p>1 Q. Is cornstarch capable of 2 causing an inflammatory process? 3 A. It can. It is -- but it is -- 4 it's a different level of risk for 5 inflammatory responses than is talc, just by 6 its chemical nature. 7 Q. Have you done an analysis in 8 your report that examines the differences 9 between the inflammatory response that can be 10 triggered by talc as opposed to cornstarch? 11 A. I haven't analyzed inflammatory 12 response. Instead, what I've done is done a 13 comparison of what the toxicity -- the 14 differences in the toxicity potential have 15 been described in medical literature, and I 16 cite -- I have a paragraph where I cite to 17 some sources that talk about the differences 18 in the toxicity potential or biocompatibility 19 of starch versus talc. 20 Q. Now, I had a question about 21 your supplemental report that was marked as 22 Exhibit 3 to the deposition. 23 At paragraph 67... 24 A. Okay. 25 Q. You identify here six heavy</p>	<p>1 only three heavy metals: chromium, cobalt 2 and nickel. 3 Do you see that? 4 A. Yes. 5 Q. Why did you remove three of the 6 heavy metals? 7 A. It's not so much removing. 8 Those three heavy metals that I focused on in 9 my MDL report are ones that have been talked 10 about with a similar mechanism of action as 11 far as irritation and biologic -- biologic 12 plausibility mechanism being irritation and 13 inflammation. 14 So that's why I focus on those 15 three, which may not -- which is not 16 necessarily the case for some of the others, 17 even though they're also -- have a 18 carcinogenic hazard, pose a risk. 19 Q. So in your -- as part of your 20 risk assessment that you performed in the 21 MDL, are you offering the opinion that to the 22 extent they exist in any of the Johnson 23 talcum powder products, that arsenic, lead -- 24 A. Cadmium. 25 Q. -- and cadmium play any role in</p>
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<p>1 metals - arsenic, chromium, lead, cobalt, 2 cadmium and nickel - that in your 3 supplemental report dated August 29, 2018, 4 you say have been reported across lots of 5 talc powders. 6 Do you see that? 7 A. Are you in -- now you're in my 8 MDL report or here? 9 Q. No. 10 A. Oh, so where are you? I'm 11 sorry. 12 Q. Same report. It's the sentence 13 that begins at the bottom of page 6. 14 A. Okay. Hold on. 15 About that they have varied at 16 the levels -- 17 Q. Yes. So you identify six 18 different types of heavy metals. 19 Do you see that there? 20 A. Yes, I do. 21 Q. Okay. And the question I had 22 for you was that in your report in the MDL, 23 if you look at paragraph 36 -- 24 A. Yes. 25 Q. -- you identify -- you identify</p>	<p>1 the risk of developing ovarian cancer? 2 A. That is not an opinion that I 3 would be offering in the MDL. 4 Q. Okay. Now, you talk about 5 these heavy metals having been classified by 6 different agencies as either known probable 7 or possible human carcinogens, correct? 8 A. You're in my MDL report again? 9 Q. Oh, yes. 10 A. Okay. I'm sorry. Okay. Let 11 me get there. 12 Yeah, I do have that 13 discussion. I'm just trying to find it. 14 Q. Sure. 15 A. Okay. Yes, I'm there. 16 Q. Is it your view, based on your 17 expertise, that because a compound can cause 18 one type of cancer, it can cause all types of 19 cancer? 20 A. No, not necessarily. It 21 depends on the -- well, it depends on a 22 couple of things. It depends on what's been 23 studied. Have all types of cancer even been 24 studied. And then it also -- it also depends 25 upon, I believe, the route of exposure as</p>

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<p>1 well. So can it get to where it could cause 2 that, could it distribute there. And then in 3 addition to that, what data has been 4 collected. Is there enough data, for 5 example, to show that there's extrapolation 6 from animals to humans in the types of tumors 7 or is it -- or if we have good human data, 8 then we would focus on the types of cancers 9 that you're seeing in humans, for example. 10 Q. Okay. But you recognize even 11 where there is complete data some compounds 12 can cause one type of cancer and they are 13 incapable of causing another type, correct? 14 MS. PARFITT: Objection. Form. 15 THE WITNESS: I don't know 16 about incapable, but I would agree 17 that you certainly would see -- you 18 could potentially see different 19 observations. 20 If you're talking about animals 21 versus humans, or are you talking 22 about -- 23 QUESTIONS BY MS. BRANSCOME: 24 Q. If humans. 25 A. Based on what you had seen in</p>	<p>1 you can extrapolate with scientific basis 2 from one type of cancer cause to ovarian 3 cancer with respect to the heavy metals 4 specifically? 5 A. Well, I haven't attempted to 6 that, because I haven't attempted to define a 7 independent risk for each of those metals 8 individually. 9 The issue -- the issue I have 10 with those metals is -- there's a paragraph 11 here where I talk about pathogenesis of 12 carcinogenesis, where I talk about different 13 stages of cancer development and the fact 14 that inflammatory responses may be operating 15 at all those different stages. 16 So the issue is you have 17 potential -- you have compounds that are 18 known to produce cancer or have been shown to 19 have a potential risk of cancer. They share 20 a similar mechanism to talc, so as a result 21 of that, they factor into your risk 22 assessment as far as there being an exposure 23 to a mixture. 24 But on the issue of ovarian 25 cancer, I'm looking at the data that's been</p>
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<p>1 the animals; is that what you're asking me? 2 Q. Yes. 3 A. Yes. So, yes, there is not 4 always a one-to-one concordance. So that's 5 why -- that's why I made the comment that 6 it's important to have some human data or 7 experience, so that you can put in context 8 the data you collected in animals. 9 I would say to you there are 10 certain kinds of tumors in animals, for 11 example, that are shown to be not relevant at 12 all to human risk assessment. Like four 13 stomach tumors in rats is an example. I've 14 dealt with that one a lot. 15 Q. What types of cancer -- type or 16 types of cancer are the basis for the 17 classification of chromium as a known human 18 carcinogen by IARC? 19 A. So I have to pull it out, but I 20 believe that there may be some GI cancers and 21 maybe some skin cancers, but I'm not sure. 22 I've got it pull it out. It's been a while 23 since I've looked at it. 24 Q. Okay. Have you done an 25 analysis to evaluate whether or not the types</p>	<p>1 collected on talc itself, which would be talc 2 with the constituents that could include the 3 metals. But certainly I'm not saying that it 4 is -- without the presence of one or the 5 other of these there would be no risk of 6 ovarian cancer. I'm not saying that either. 7 Q. So my question is, though, can 8 you point me either to scientific literature 9 directly documenting that these heavy metals 10 can cause ovarian cancer or to scientific 11 literature that enables you to extrapolate 12 from the types of cancer that they are known 13 or believed to cause to ovarian cancer? 14 A. So I -- on the issue of can I 15 point you to the data on ovarian cancer, I'd 16 have to go back. I can't answer that without 17 looking at the assessments. 18 But on the other -- second 19 question you asked me, that's the question I 20 was just trying to answer before. It's the 21 idea that regardless of where the cancer is 22 developing, the fact that these compounds 23 have the ability to stimulate similar toxic 24 responses in tissues could lead to a -- 25 setting up a situation where the -- where the</p>

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<p>1 tissue is primed for cancer development.</p> <p>2 Q. And do you have --</p> <p>3 A. And so that --</p> <p>4 Q. Sorry.</p> <p>5 A. And that has to do with the</p> <p>6 basic science of carcinogenesis when you look</p> <p>7 at underlying mechanisms, especially with</p> <p>8 tissue contact, direct tissue contact, with</p> <p>9 irritants or inflammatory processes.</p> <p>10 But I would -- I am not -- I</p> <p>11 have not formed the opinion, again, that with</p> <p>12 or without either one of these that I would</p> <p>13 expect ovarian cancer to be the target. I'm</p> <p>14 saying that ovarian cancer risk is increased</p> <p>15 based on exposure to talc, which includes a</p> <p>16 variety of constituents.</p> <p>17 Q. Okay. And do you cite anywhere</p> <p>18 in your report to studies documenting -- I</p> <p>19 know you said you'd need to go look at them,</p> <p>20 but I'm asking if it's in your report</p> <p>21 anywhere a discussion of any studies showing</p> <p>22 that the particular heavy metals that you</p> <p>23 cite as potential constituents of Johnson &</p> <p>24 Johnson's products have been demonstrated to</p> <p>25 increase a risk for ovarian cancer on their</p>	<p>1 So, again, that's what I'm</p> <p>2 pointing to and why I have cited the data.</p> <p>3 Q. Now, you talked about -- when</p> <p>4 we were discussing mechanism, you said that</p> <p>5 inflammation alone is not necessarily</p> <p>6 sufficient to cause cancer, correct?</p> <p>7 A. Yes, I did.</p> <p>8 Q. All right. Do you have</p> <p>9 scientific studies that show that any of the</p> <p>10 heavy metals or the fragrance constituents</p> <p>11 that you identify as potential carcinogens</p> <p>12 create -- generate phenotypic changes like</p> <p>13 you discussed were next for the formation of</p> <p>14 cancer?</p> <p>15 A. I believe that data is</p> <p>16 available on nickel. I need to go back and</p> <p>17 look at chromium and cobalt, but I do believe</p> <p>18 with nickel you'll find similar data on</p> <p>19 tissue irritation and inflammatory processes.</p> <p>20 Nickel is also a sensitizer, so</p> <p>21 it has interaction with the immune system, so</p> <p>22 I do believe that for nickel you can find</p> <p>23 some of that data.</p> <p>24 Q. Okay. But as you sit here</p> <p>25 today, can you point me into any of that</p>
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<p>1 own?</p> <p>2 A. So, no, I haven't addressed</p> <p>3 that in my report. And again, I think that's</p> <p>4 inconsistent with the way I'm using these</p> <p>5 data. But that's fine. I mean, no, I</p> <p>6 haven't done a specific assessment of ovarian</p> <p>7 cancer risk with each of those metals</p> <p>8 individually.</p> <p>9 Q. I would ask the same questions</p> <p>10 for the different fragrance constituents that</p> <p>11 you allege in your report are potential</p> <p>12 carcinogens.</p> <p>13 Have you done any analysis, and</p> <p>14 can you point me to any scientific studies</p> <p>15 that establish that those particular</p> <p>16 compounds are capable of causing ovarian</p> <p>17 cancer?</p> <p>18 A. No, I haven't done that</p> <p>19 analysis, but, again, general principles of</p> <p>20 toxicology and cancer risk assessment, when</p> <p>21 you look at the presence of multiple --</p> <p>22 excuse me, multiple carcinogens with similar</p> <p>23 mechanisms of action, you would assume in</p> <p>24 your risk assessment that those risks could</p> <p>25 be additive.</p>	<p>1 that's discussed in your report?</p> <p>2 A. No specific discussion other</p> <p>3 than, again, all -- the IARC -- I'm citing to</p> <p>4 the IARC assessments, and the IARC</p> <p>5 assessments for each of those discuss</p> <p>6 carcinogenesis and a biologically plausible</p> <p>7 mechanism being linked to the ability of</p> <p>8 these compounds to induce oxidative stress</p> <p>9 and/or inflammatory processes.</p> <p>10 Q. Okay. In your opinion, you</p> <p>11 talk about the mixture of constituents that</p> <p>12 are involved in talc.</p> <p>13 Have you done any analysis to</p> <p>14 look at how the different constituents</p> <p>15 interact with each other?</p> <p>16 A. Well, yes, that's my issue at</p> <p>17 looking at underlying mechanism.</p> <p>18 But are you asking me -- I</p> <p>19 certainly don't have a -- the only studies</p> <p>20 that I have to rely upon on the interaction</p> <p>21 of the mixture is the actual studies on the</p> <p>22 powders themselves, where we know that the</p> <p>23 powders contain constituents other than just</p> <p>24 platy talc.</p> <p>25 Q. Okay. And do the constituents</p>

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<p>1 need to have the same underlying potential</p> <p>2 carcinogenic mechanism for them to have an</p> <p>3 additive effect?</p> <p>4 A. By general principles of</p> <p>5 toxicology, yes, you look at mode -- mode of</p> <p>6 action or mechanism of action before you</p> <p>7 apply that additivity principle to the cancer</p> <p>8 risk assessment.</p> <p>9 Q. And so as you sit here, you</p> <p>10 believe there have been scientific</p> <p>11 documentation that nickel might operate</p> <p>12 through the same biological mechanism as you</p> <p>13 purport talc to operate, but you're not sure</p> <p>14 about the other heavy metals or the fragrance</p> <p>15 constituents; is that correct?</p> <p>16 MS. PARFITT: Objection.</p> <p>17 THE WITNESS: For the fragrance</p> <p>18 constituents, I'd definitely have to</p> <p>19 pull because I haven't looked at that</p> <p>20 individual assessment in a while.</p> <p>21 For these three, what I do know</p> <p>22 is that they do share the ability to</p> <p>23 at least induce oxidative stress.</p> <p>24 What I can't recall for</p> <p>25 chromium and for cobalt is whether</p>	<p>1 So those two -- we'd have human data</p> <p>2 to show that.</p> <p>3 But on the issue of cobalt, it</p> <p>4 may only be -- I need to go back and</p> <p>5 look, but it may indeed just be animal</p> <p>6 data.</p> <p>7 QUESTIONS BY MS. BRANSCOME:</p> <p>8 Q. And so your basis for that</p> <p>9 would be the IARC classification?</p> <p>10 Is that where I would go to</p> <p>11 look if I wanted to look at it after this</p> <p>12 deposition?</p> <p>13 A. I'd go to the IARC reviews.</p> <p>14 I'd go to those three which I believe I have</p> <p>15 cited down here for you and given you where</p> <p>16 to go to find them.</p> <p>17 Q. Okay. You discuss in your</p> <p>18 report -- and if you'd like to reference it,</p> <p>19 it's paragraph 69 on page 47 -- the concept</p> <p>20 of genotoxic and nongenotoxic carcinogens.</p> <p>21 Do you recall that?</p> <p>22 A. Yes.</p> <p>23 Q. And as you sit here today, is</p> <p>24 it your opinion that talc is more likely a</p> <p>25 nongenotoxic carcinogen?</p>
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<p>1 they're taking it the next step from</p> <p>2 oxidative stress to inflammatory</p> <p>3 process. I believe that they do, but</p> <p>4 I'd have to check, whereas I know</p> <p>5 nickel has been shown to lead to an</p> <p>6 inflammatory process after oxidative</p> <p>7 stress has been induced.</p> <p>8 QUESTIONS BY MS. BRANSCOME:</p> <p>9 Q. And you would agree, even more</p> <p>10 than requiring an inflammatory process, you</p> <p>11 would actually have to see that these</p> <p>12 compounds can generate phenotypic changes,</p> <p>13 correct?</p> <p>14 MS. PARFITT: Objection.</p> <p>15 THE WITNESS: Well, we know</p> <p>16 they do because they've been shown to</p> <p>17 be carcinogenic. If you've been shown</p> <p>18 to be carcinogenic, you've done a</p> <p>19 phenotypic change in the cell from a</p> <p>20 normal cell to a cancer cell.</p> <p>21 So we know they have the</p> <p>22 capability to induce tumors, or</p> <p>23 cancer, all three of those, at least</p> <p>24 in animals if not in humans as well,</p> <p>25 because two of them are known human.</p>	<p>1 A. As the direct insult, yes. And</p> <p>2 I would like to -- I would like to point out</p> <p>3 that in the literature -- the reason I have</p> <p>4 this paragraph here is because in the</p> <p>5 literature in the past, in the area of</p> <p>6 chemicals, it's been -- toxicologists have</p> <p>7 attempted to put two bins, direct genotoxic</p> <p>8 insult versus nondirect genotoxic. It</p> <p>9 doesn't mean you can't get a genotoxic event</p> <p>10 after the initiation.</p> <p>11 So I want to make sure you</p> <p>12 understand that. I'm not saying that there</p> <p>13 is no possibility of this chemical in its --</p> <p>14 in its process of inducing cancer leading to</p> <p>15 indirect genotoxicity, but I'm talking about</p> <p>16 the direct mechanism at the site of the cell.</p> <p>17 So talc, for example, has been</p> <p>18 shown to not be genotoxic in cells. And so</p> <p>19 that's why I believe, then, when I look at</p> <p>20 the rest of the data that fits, that it fits</p> <p>21 the definition of a nongenotoxic carcinogen</p> <p>22 by its initial mechanisms to induce cancer.</p> <p>23 Q. Okay. And if talc is, in fact,</p> <p>24 a nongenotoxic carcinogen, it would suggest</p> <p>25 that there is likely a threshold dose below</p>

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<p>1 which it does not have a carcinogenic effect, 2 correct? 3 MS. PARFITT: Objection. 4 THE WITNESS: It is possible, 5 and that's the problem. In order to 6 fully assess that, you would have to 7 have the data to prove it. 8 But that's the assumption. You 9 assume with nongenotoxic carcinogens 10 that you could identify a level where 11 you wouldn't turn on that indirect 12 mechanism. So that -- yes, that is 13 true. 14 QUESTIONS BY MS. BRANSCOME: 15 Q. And you have not been able to 16 identify, nor can you point to, scientific 17 literature that identifies a threshold -- a 18 threshold dose for talc with respect to its 19 carcinogenic potential for ovarian cancer, 20 correct? 21 A. Not a specific dose, but I 22 think that's why I mentioned to you -- and 23 I -- I think that's why Canada, when you look 24 at their document, they talk about 25 discouraging routine use generally. So it's</p>	<p>1 what they've done, but is it possible 2 that they would do it? Any regulatory 3 agency, it's possible they could do 4 it, yes. 5 QUESTIONS BY MS. BRANSCOME: 6 Q. Do you have any information 7 with respect to Health Canada's 8 decision-making, other than what you have 9 read on the face of the documents? 10 A. That is all I have to look at 11 is what is provided on the website. 12 Q. Okay. And so the statement 13 that you think Health Canada was suggesting a 14 dose threshold by their statement of 15 discouraging routine use, you're basing that 16 entirely on what you read on the piece of 17 paper, correct? 18 MS. PARFITT: Objection. Form. 19 THE WITNESS: Well, that's what 20 they state. So, yes, I'm -- I am 21 telling you what I see on their 22 website. If that's what you're asking 23 me, yes, that is true. 24 QUESTIONS BY MS. BRANSCOME: 25 Q. Okay. Can you point me --</p>
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<p>1 the issue of what -- single use of a body 2 powder or an occasional use is a different 3 risk assessment than routine use. 4 So if you want to talk about 5 thresholds that way, that's very imprecise, 6 but you could do that. You can talk about 7 whether or not there -- I do believe there's 8 a different risk profile for one or two uses 9 of talc body powder versus a risk profile of 10 somebody who uses it routinely, because I 11 think that fits that threshold definition. 12 It's the idea that you have limited 13 availability for enough particles to migrate 14 to lead to the tissue toxicity that it cannot 15 be recovered from or repair. 16 Q. You're familiar with the 17 concept of the precautionary principle, 18 correct? 19 A. Yes. 20 Q. All right. And you understand 21 that Health Canada may have made 22 recommendations with respect to product usage 23 that are purely precautionary, correct? 24 MS. PARFITT: Objection. Form. 25 THE WITNESS: I disagree that's</p>	<p>1 well, do you discuss -- have you looked at, 2 as part of your opinion specifically in the 3 MDL, the studies exploring a potential link 4 between asbestos and ovarian cancer? Just 5 asbestos. 6 A. Some of the studies, yes, but I 7 have not -- I have not done a separate risk 8 assessment just for asbestos by itself, 9 because I have not assumed that there is 10 asbestos-only exposure. 11 Does that make sense? 12 But I do cite -- for example, I 13 cite to some of the early literature on -- so 14 this -- I guess where this opinion comes in 15 is on hazard and warning. So in the warnings 16 I talk about when it was known that asbestos 17 was linked with cancer, because the warning 18 standard is not causation proven but the 19 identification of the potential. And so that 20 is in my report on warnings, but that is not 21 within my discussion of the weight of the 22 evidence for risk assessment of the talc 23 product. 24 Q. Okay. 25 A. Does that make sense?</p>

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<p>1 Q. Uh-huh.</p> <p>2 For example, have you rendered</p> <p>3 an opinion about what dose of asbestos</p> <p>4 exposure would be necessary to cause ovarian</p> <p>5 cancer in an individual?</p> <p>6 A. No, I have not formed that</p> <p>7 opinion at this time.</p> <p>8 Q. Okay. Do you have an opinion</p> <p>9 about the background level of asbestos to</p> <p>10 which individuals are exposed with no</p> <p>11 increased risk of any type of cancer?</p> <p>12 A. No, I do not have an opinion.</p> <p>13 I do believe others do, but I do not.</p> <p>14 Q. Okay. You may have been asked</p> <p>15 some of these questions before, but I will</p> <p>16 keep them brief.</p> <p>17 Have you ever published any</p> <p>18 articles that state that talc causes ovarian</p> <p>19 cancer?</p> <p>20 A. No, I have not.</p> <p>21 Q. Have you ever publicly</p> <p>22 expressed the opinion that talc increases the</p> <p>23 risk of ovarian cancer outside of literature?</p> <p>24 A. No. My work has been in the --</p> <p>25 in the courtroom.</p>	<p>1 not classified any of the heavy metals that</p> <p>2 you've identified in your MDL report as</p> <p>3 carcinogenic to the ovary?</p> <p>4 A. So the answer is I'd have to</p> <p>5 look. I don't recall that, but I'd have to</p> <p>6 look to confirm.</p> <p>7 Q. Okay.</p> <p>8 A. That's the answer I believe I</p> <p>9 gave a few minutes ago, yes.</p> <p>10 Q. So if I look at the IARC</p> <p>11 website, then I can confirm whether or not</p> <p>12 they have identified any of those as</p> <p>13 carcinogenic to the ovary?</p> <p>14 A. Not so much the web -- well,</p> <p>15 the website or the actual documents. I think</p> <p>16 I would actually point you to the actual</p> <p>17 monograph --</p> <p>18 Q. To the monograph.</p> <p>19 A. -- because there may be</p> <p>20 evidence in there of ovarian cancer as being</p> <p>21 seen in studies. And I'd have to go look.</p> <p>22 Q. Okay. That was not part of</p> <p>23 your consideration here, correct?</p> <p>24 A. So ovarian cancer is part of my</p> <p>25 consideration, but I didn't -- in this part</p>
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<p>1 MS. BRANSCOME: I think we can</p> <p>2 take a break.</p> <p>3 VIDEOGRAPHER: We are going off</p> <p>4 the record at 2:57 p.m.</p> <p>5 (Off the record at 2:57 p.m.)</p> <p>6 VIDEOGRAPHER: We are back on</p> <p>7 the record at 3:13 p.m.</p> <p>8 MS. BRANSCOME: Dr. Plunkett, I</p> <p>9 have no more questions for you on</p> <p>10 behalf of Johnson & Johnson, subject</p> <p>11 to your counsel doing a direct of any</p> <p>12 kind.</p> <p>13 THE WITNESS: Sure. Thank you.</p> <p>14 EXAMINATION</p> <p>15 QUESTIONS BY MS. BOCKUS:</p> <p>16 Q. Good afternoon, Dr. Plunkett.</p> <p>17 You and I have met before. My name is Jane</p> <p>18 Bockus, and as you know, I represent Imerys</p> <p>19 in this case.</p> <p>20 A. Yes.</p> <p>21 Q. Correct?</p> <p>22 I want to go back to just touch</p> <p>23 briefly on a couple of issues that have</p> <p>24 already been addressed.</p> <p>25 Would you agree that IARC has</p>	<p>1 of my evaluation I'm trying to -- trying to</p> <p>2 describe these metals. And this is really</p> <p>3 about mechanism of biologic plausibility and</p> <p>4 the fact that these two things can go</p> <p>5 together, and then the concept of additivity</p> <p>6 is they're on hazard. The idea if you have a</p> <p>7 cancer hazard generally and you have similar</p> <p>8 mode of action, regardless of the tissue, you</p> <p>9 would be expected to have a potential</p> <p>10 additive effect when you do a risk</p> <p>11 assessment.</p> <p>12 So that's my use of that data,</p> <p>13 which is why I didn't do a separate ovarian</p> <p>14 cancer assessment for each of the each</p> <p>15 constituents but just on powder.</p> <p>16 Q. And you discuss that topic on</p> <p>17 page 47, paragraph 68, of your report,</p> <p>18 correct, the -- whether there's an additive</p> <p>19 effect?</p> <p>20 And you cite to Casarett and</p> <p>21 Doull. I don't know if I'm pronouncing those</p> <p>22 names correctly.</p> <p>23 A. I'm sorry, on what page?</p> <p>24 Q. I'm on page 47, paragraph 68.</p> <p>25 A. Okay. Sorry. I should know</p>

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<p>1 where it is, but...</p> <p>2 Okay. I'm there, yes. Okay.</p> <p>3 Yes, I do cite to a chapter in</p> <p>4 Casarett and Doull, yes.</p> <p>5 Q. Okay. And Casarett and Doull</p> <p>6 is a resource that you cite to for a couple</p> <p>7 of different toxicological principles that</p> <p>8 you discuss in your -- in your report,</p> <p>9 correct?</p> <p>10 A. Yes, because it's one of the</p> <p>11 most well-recognized textbooks that is used</p> <p>12 across different either universities or</p> <p>13 schools or even in regulatory agencies.</p> <p>14 I would also say I cite EPA</p> <p>15 2000 there. I'm not citing just Casarett,</p> <p>16 but I am citing Casarett as well as an EPA</p> <p>17 guidance document.</p> <p>18 Q. In Casarett and Doull, do they</p> <p>19 actually discuss talcum powder in Chapter 2,</p> <p>20 or is it more just the concept of the</p> <p>21 potential of the effects when you have two</p> <p>22 different chemicals that you're exposed to at</p> <p>23 once or three or four?</p> <p>24 A. It's the latter. It's the --</p> <p>25 because you'll notice the title is</p>	<p>1 a genetically susceptible mouse study</p> <p>2 to hurry the process along to look at,</p> <p>3 but you might not be able to do it</p> <p>4 through perineal exposure. You might</p> <p>5 have to do it through another route</p> <p>6 such as either inhalation or maybe</p> <p>7 even you could -- you could look at it</p> <p>8 through intraperitoneal injections,</p> <p>9 for example.</p> <p>10 QUESTIONS BY MS. BOCKUS:</p> <p>11 Q. Well, and what the textbook</p> <p>12 talks about is the fact that you need to</p> <p>13 study it to find out whether the effects are</p> <p>14 additive, whether the effects are something</p> <p>15 that multiply the risk, you know, so that the</p> <p>16 two together are greater than either one</p> <p>17 alone, or do the effects offset each other</p> <p>18 and reduce the risk, correct?</p> <p>19 A. That is discussed there --</p> <p>20 MS. PARFITT: Objection.</p> <p>21 THE WITNESS: -- which is why</p> <p>22 I've cited the EPA document. Because</p> <p>23 the EPA document addresses the issue</p> <p>24 of mixtures, and this is the issue of</p> <p>25 mode of action. If you have chemicals</p>
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<p>1 "Principles of Toxicology," so it's the</p> <p>2 general chapter teaching principles for risk</p> <p>3 assessment and toxicology as used in risk</p> <p>4 assessment.</p> <p>5 Q. And whether there is an</p> <p>6 additive effect of, say, talc and nickel,</p> <p>7 that's something that an experiment could be</p> <p>8 designed to study, correct?</p> <p>9 MS. PARFITT: Objection.</p> <p>10 THE WITNESS: If you're talking</p> <p>11 generally for cancer and not worried</p> <p>12 about the issue of ovarian cancer, if</p> <p>13 you're talking about cancer, like</p> <p>14 doing an inhalation experiment to look</p> <p>15 what happens to the lung, that you</p> <p>16 could do.</p> <p>17 The problem with the animal</p> <p>18 studies and ovarian cancer due to</p> <p>19 perineal exposure is it's very</p> <p>20 difficult to understand how you design</p> <p>21 a study to expose the animals that way</p> <p>22 reliably in the way that humans are</p> <p>23 exposed.</p> <p>24 But generally you could</p> <p>25 study -- you might even be able to do</p>	<p>1 that you're looking at on the issue of</p> <p>2 additivity or no effect, you will --</p> <p>3 you look at that issue of how they're</p> <p>4 affecting the tissue and underlying</p> <p>5 mechanism.</p> <p>6 But the only way to look at the</p> <p>7 magnitude absolutely of how the risk</p> <p>8 would change is by doing an</p> <p>9 experiment. That is true.</p> <p>10 QUESTIONS BY MS. BOCKUS:</p> <p>11 Q. And to your knowledge, that</p> <p>12 experiment has never been done; is that</p> <p>13 correct?</p> <p>14 A. I can't guarantee that it's</p> <p>15 only been done for nickel and talc alone, but</p> <p>16 I would -- I would state that based on --</p> <p>17 there are studies out there that have been</p> <p>18 done where they've used the body powder that</p> <p>19 we know have metals -- a variety of things</p> <p>20 within it that are not just platy talc, but</p> <p>21 those experiments are that kind of data.</p> <p>22 But as far as gathering</p> <p>23 dose-response information or teasing out</p> <p>24 individual components, that is not available.</p> <p>25 Q. Do you agree that dose response</p>

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<p>1 is the fundamental principle of toxicology</p> <p>2 that underpins the effects that chemicals can</p> <p>3 have on living organisms?</p> <p>4 A. When you're talking general</p> <p>5 toxicology, yes, I think it's talked about in</p> <p>6 the textbook.</p> <p>7 Q. And you agree that it is the</p> <p>8 dose of the chemical and the pattern of</p> <p>9 exposure that determines whether a chemical</p> <p>10 produces an adverse effect on an organism,</p> <p>11 not simply the presence of the chemical?</p> <p>12 A. For a typical dose-response</p> <p>13 relationship for non -- for nongenotoxic</p> <p>14 events, absolutely, I would agree that is</p> <p>15 probably true. And I don't mean nongeno --</p> <p>16 noncancer events.</p> <p>17 In the issue of cancer biology,</p> <p>18 some of those issues don't hold all the time.</p> <p>19 In other words, there are certain chemicals</p> <p>20 and certain ways of looking at cancer risk</p> <p>21 assessment where you can't assume where the</p> <p>22 threshold is or identify what a safe dose</p> <p>23 would be. But certainly I agree on the issue</p> <p>24 of noncancer risk assessment generally, or</p> <p>25 general end points of toxicity, that is true.</p>	<p>1 A. That is true with the exception</p> <p>2 of Parmley and Woodruff, which addresses this</p> <p>3 issue of --</p> <p>4 MS. PARFITT: Objection.</p> <p>5 THE WITNESS: Talks about the</p> <p>6 issue of exposure from the outside to</p> <p>7 the inside.</p> <p>8 But the data that is collected</p> <p>9 with the different studies they have</p> <p>10 deposited at some point -- at some</p> <p>11 position within the vagina, that is</p> <p>12 true.</p> <p>13 QUESTIONS BY MS. BOCKUS:</p> <p>14 Q. And that is not how talc is</p> <p>15 deposited in women who use it regularly in</p> <p>16 their daily routine, correct?</p> <p>17 MS. PARFITT: Objection.</p> <p>18 Misstates the evidence.</p> <p>19 THE WITNESS: So I would say</p> <p>20 that depends on what women are doing.</p> <p>21 Perineal application, for example,</p> <p>22 application on the underwear, can lead</p> <p>23 to contact of the vaginal opening</p> <p>24 depending on the woman.</p> <p>25 For example, a woman who has</p>
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<p>1 Q. And again, do you agree that in</p> <p>2 general toxicology the effects that might be</p> <p>3 reported at high doses will not occur at</p> <p>4 lower doses if the concentration at the site</p> <p>5 of action falls below the threshold for</p> <p>6 toxicity?</p> <p>7 A. Yes, that could -- that could</p> <p>8 be possible, yes.</p> <p>9 Q. And do you agree that</p> <p>10 evidence-based toxicology and epidemiology</p> <p>11 dictates that the dose of the chemical is the</p> <p>12 critical factor when examining the risk posed</p> <p>13 by a chemical, not just its presence even in</p> <p>14 the human body?</p> <p>15 A. I would say that's generally</p> <p>16 true, yes, which is why I have attempted to</p> <p>17 look at the dose-response relationship as</p> <p>18 well as the prevalence of the contact.</p> <p>19 Q. And with regard to the human</p> <p>20 studies that you cite, would you agree that</p> <p>21 none of the studies that you cite in your</p> <p>22 report that have to do with migration of</p> <p>23 particles within the genital tract of the</p> <p>24 female involve applications to the perineum</p> <p>25 or outside of the genital tract?</p>	<p>1 a -- had many children has a tract</p> <p>2 that is stretched. There, indeed, you</p> <p>3 can have more direct contact than you</p> <p>4 can with a very tight -- so I would</p> <p>5 say it depends on the woman and it</p> <p>6 depends on the situation.</p> <p>7 But I do think it's generally</p> <p>8 accepted, based on my review of the</p> <p>9 literature, that there is the</p> <p>10 opportunity for exposure internally</p> <p>11 from perineal application.</p> <p>12 QUESTIONS BY MS. BOCKUS:</p> <p>13 Q. And if I understand what you</p> <p>14 testified to earlier today and yesterday, you</p> <p>15 don't have any data that would advise on --</p> <p>16 out of the talc that is deposited in the</p> <p>17 underwear, what percentage of it makes it</p> <p>18 into the reproductive tract?</p> <p>19 A. That's the data that's missing,</p> <p>20 that is true. And unfortunately, no one has</p> <p>21 done a study. It would be -- if there was a</p> <p>22 way to do that, it would be interesting to do</p> <p>23 that. I just don't see how you design that</p> <p>24 study, especially knowing the hazard of talc</p> <p>25 at this point. I think that would be a</p>

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<p>1 difficult study to get approval for.</p> <p>2 Q. And do you have an opinion as</p> <p>3 to whether it is even correct that each day</p> <p>4 that a woman uses talc in her underwear, that</p> <p>5 some of the talc makes its way to the ovary?</p> <p>6 MS. PARFITT: Objection. Form.</p> <p>7 THE WITNESS: Have I -- can I</p> <p>8 quantify that?</p> <p>9 No, I haven't quantified it. I</p> <p>10 think I got asked that earlier. I</p> <p>11 can't quantify the amount that gets</p> <p>12 there. Or, I'm sorry, I may have</p> <p>13 misheard the start of your question.</p> <p>14 I apologize.</p> <p>15 QUESTIONS BY MS. BOCKUS:</p> <p>16 Q. Yeah, I'm really asking: Do</p> <p>17 you have an opinion as to whether it happens</p> <p>18 every single time a woman applies talc to her</p> <p>19 perineal area? Does some of that talc make</p> <p>20 it to her ovary?</p> <p>21 MR. MEADOWS: Objection.</p> <p>22 MS. PARFITT: Objection.</p> <p>23 THE WITNESS: I don't think I</p> <p>24 stated it quite that way, but</p> <p>25 certainly I think the opportunity is</p>	<p>1 migration occurs every day, once a week, once</p> <p>2 a month?</p> <p>3 MS. PARFITT: Objection. Form.</p> <p>4 THE WITNESS: I haven't</p> <p>5 formulated my point -- my opinion</p> <p>6 quite that way; however, I do believe</p> <p>7 that it is something that is going to</p> <p>8 happen routinely with exposure. I do</p> <p>9 believe that migration is something</p> <p>10 that is going on routinely with</p> <p>11 application.</p> <p>12 So with applications, I do</p> <p>13 believe that that is, but I can't tell</p> <p>14 you that this amount has migrated on</p> <p>15 this particular day with this</p> <p>16 particular application, no. That --</p> <p>17 the data that we have collected is not</p> <p>18 there to allow us to do that.</p> <p>19 QUESTIONS BY MS. BOCKUS:</p> <p>20 Q. How do you define the word</p> <p>21 "routinely" as you're using it in that</p> <p>22 answer?</p> <p>23 A. So that would be the idea of</p> <p>24 repeated exposures, you know, within a week,</p> <p>25 within a month, within a year. So not --</p>
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<p>1 there with every application. And of</p> <p>2 course it would depend upon the amount</p> <p>3 of time that the contact may be in</p> <p>4 place. But the opportunity is there.</p> <p>5 So, for example, if you applied</p> <p>6 it to your underwear and 30 minutes</p> <p>7 later you go to the bathroom, it's</p> <p>8 very possible that you will have wiped</p> <p>9 away, and so that that application may</p> <p>10 have taken an opportunity away. But I</p> <p>11 do believe that the opportunity is</p> <p>12 there based on the literature I have</p> <p>13 seen.</p> <p>14 And so I haven't formed the</p> <p>15 opinion, though, that it's absolutely</p> <p>16 every time. My opinion, I think, is</p> <p>17 based on the fact that I believe that</p> <p>18 there is data to indicate that</p> <p>19 exposure occurs, and that with</p> <p>20 routine, continual habit, sort of a</p> <p>21 habit exposure, that indeed that there</p> <p>22 was some migration that occurs.</p> <p>23 QUESTIONS BY MS. BOCKUS:</p> <p>24 Q. And is it fair to say that you</p> <p>25 don't have an opinion as to whether that</p>	<p>1 routine to me would not be -- would not be</p> <p>2 applying it once a month one month, waiting</p> <p>3 six months, doing it again, and then not</p> <p>4 doing it until the next year.</p> <p>5 Again, it's the idea -- some</p> <p>6 people may -- routine may be during the hot</p> <p>7 season of the year, they're routinely getting</p> <p>8 daily exposures when it's warm, and during</p> <p>9 the cold weather not applying. But then the</p> <p>10 next year doing -- that's a routine for them</p> <p>11 and their habits based on their pattern of</p> <p>12 exposure.</p> <p>13 Again, we know that talc, when</p> <p>14 it -- when it migrates and gets into the</p> <p>15 body, we have data to show that it is -- it</p> <p>16 is able to persist in the body. The fact</p> <p>17 that you may have not been exposed for three</p> <p>18 months because it was cold doesn't mean that</p> <p>19 you -- that that changes the fact that you're</p> <p>20 still at risk with additional exposures the</p> <p>21 next -- the next time that that habit</p> <p>22 becomes -- comes into place.</p> <p>23 So I think there's multiple</p> <p>24 exposure patterns that are possible, but when</p> <p>25 I use routine, it's something that people are</p>

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<p>1 doing throughout their -- a period of their</p> <p>2 life. And so it would be something that</p> <p>3 happens either on a weekly basis for a good</p> <p>4 part of the year. I haven't defined it with</p> <p>5 a particular number, though, no.</p> <p>6 Q. And my question had to do with</p> <p>7 out of the number of times a given woman --</p> <p>8 or an average woman uses talc, what</p> <p>9 percentage of the time does talc make its way</p> <p>10 into her reproductive tract?</p> <p>11 A. So I don't think that</p> <p>12 anybody -- anybody can point to a piece of</p> <p>13 data that tells you that, but, again, it's</p> <p>14 based upon the anatomy, I would expect there</p> <p>15 to be the potential each time it's applied.</p> <p>16 And on your question on</p> <p>17 routine, when I'm talking routine, I'm</p> <p>18 looking at not just frequency but also</p> <p>19 duration. So when I'm talking about dose,</p> <p>20 it's the fact that they do it on a repeated</p> <p>21 basis for a number of -- a period of years as</p> <p>22 well.</p> <p>23 That's what the data shows in</p> <p>24 the human studies. It's not something,</p> <p>25 again, that may have been done routinely for</p>	<p>1 opinion on a set number, no. I can't --</p> <p>2 can't point you a specific number.</p> <p>3 I'm not doing case-specific, so</p> <p>4 I've not looked at any of those pieces of</p> <p>5 information for any given plaintiff.</p> <p>6 Q. And I'm just trying to get the</p> <p>7 threshold.</p> <p>8 A. Uh-huh.</p> <p>9 Q. As I understand it, that is</p> <p>10 part of a toxicological evaluation, is the</p> <p>11 threshold below which there's not an issue.</p> <p>12 So I think you've said you</p> <p>13 don't know if it's less than a year, but you</p> <p>14 think it's more likely than not that it's</p> <p>15 greater than one month.</p> <p>16 MR. MEADOWS: Objection.</p> <p>17 QUESTIONS BY MS. BOCKUS:</p> <p>18 Q. Is that fair?</p> <p>19 A. No, that's not exactly what I'm</p> <p>20 saying. I'm saying we don't know the</p> <p>21 threshold. So as a result, I'm not of the</p> <p>22 opinion that it absolutely can't -- it only</p> <p>23 has to be this long.</p> <p>24 What I'm saying to you is per</p> <p>25 general principles of toxicology and based on</p>
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<p>1 one year, but it does appear to be something</p> <p>2 that's done more -- longer term than that.</p> <p>3 But we can't give a number. We</p> <p>4 have no threshold. We don't know exactly</p> <p>5 what that minimum number is.</p> <p>6 Q. Do you think that the minimum</p> <p>7 number is greater than a year?</p> <p>8 MS. PARFITT: Objection. Form.</p> <p>9 THE WITNESS: I haven't formed</p> <p>10 that opinion, no.</p> <p>11 QUESTIONS BY MS. BOCKUS:</p> <p>12 Q. Do you think it's greater than</p> <p>13 a month?</p> <p>14 MR. MEADOWS: Objection.</p> <p>15 THE WITNESS: Greater than a</p> <p>16 month?</p> <p>17 QUESTIONS BY MS. BOCKUS:</p> <p>18 Q. Yes.</p> <p>19 A. One month in their life?</p> <p>20 Q. One month in their life, where</p> <p>21 they're using it every day for a month.</p> <p>22 A. So I haven't formed that</p> <p>23 opinion at this point in time, but I'd say</p> <p>24 it's more likely to occur when you do it more</p> <p>25 than a month. But I haven't formed an</p>	<p>1 the human data that we have, it indicates</p> <p>2 that it's more frequent than just one month,</p> <p>3 but I can't tell you that it's absolutely not</p> <p>4 possible.</p> <p>5 That's where -- I do think when</p> <p>6 you're talking about those kinds of patterns,</p> <p>7 that's a case-specific issue for individuals,</p> <p>8 because I think that would have to be</p> <p>9 considered for each individual. But</p> <p>10 certainly as a toxicologist, I'm using the</p> <p>11 words "routine," "repeated," "longer</p> <p>12 duration," "chronic exposure." And when I</p> <p>13 defined "chronic" earlier, I talked about</p> <p>14 years of exposure versus just one month.</p> <p>15 That would be consistent with</p> <p>16 what I have said, yes, but I'm not -- I -- I</p> <p>17 certainly don't want to rule out that there</p> <p>18 couldn't be somebody out there that could</p> <p>19 show something different, because it may very</p> <p>20 well be that there are people that you can</p> <p>21 identify with the presence of talc in their</p> <p>22 ovaries and all of their other case-specific</p> <p>23 things that could -- could make that pattern</p> <p>24 a -- make someone be able to draw a</p> <p>25 case-specific, reliable conclusion.</p>

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<p>1 But that's not my role. I</p> <p>2 don't do case-specific.</p> <p>3 Q. And I am simply trying to get</p> <p>4 the parameters of your opinions with regard</p> <p>5 to the amount of talc use one would need to</p> <p>6 have before you would feel comfortable --</p> <p>7 well, that in your opinion would be</p> <p>8 sufficient to create a toxic environment.</p> <p>9 MR. MEADOWS: Objection.</p> <p>10 THE WITNESS: Well, that's a</p> <p>11 different question. So toxic</p> <p>12 environment could be with a much</p> <p>13 shorter time exposure, okay?</p> <p>14 QUESTIONS BY MS. BOCKUS:</p> <p>15 Q. Right.</p> <p>16 A. So but if you're talking</p> <p>17 about -- the opinion that I have formed has</p> <p>18 to do with an increased risk of ovarian</p> <p>19 cancer. So with that opinion, that's the</p> <p>20 description, I believe, I was giving this</p> <p>21 morning. It's the idea that the data that</p> <p>22 I've seen indicates that my opinion that</p> <p>23 perineal use of talc body powder products</p> <p>24 increases your risk for ovarian cancer above</p> <p>25 that background level that you know exists.</p>	<p>1 QUESTIONS BY MS. BOCKUS:</p> <p>2 Q. Okay. An ingredient supplier.</p> <p>3 And you agree that Imerys does</p> <p>4 not sell any products to the general public,</p> <p>5 correct?</p> <p>6 MR. MEADOWS: Objection.</p> <p>7 THE WITNESS: I don't know</p> <p>8 that's definitely true, but I'm not</p> <p>9 aware that they do.</p> <p>10 QUESTIONS BY MS. BOCKUS:</p> <p>11 Q. And what Imerys supplies to</p> <p>12 Johnson & Johnson is not a finished cosmetic</p> <p>13 that is ready to be sold on the market,</p> <p>14 correct?</p> <p>15 MR. MEADOWS: Objection.</p> <p>16 MS. PARFITT: Objection.</p> <p>17 THE WITNESS: I don't know that</p> <p>18 I can answer that except in the</p> <p>19 context of Johnson & Johnson's baby</p> <p>20 powder, SHOWER TO SHOWER® and Shimmer,</p> <p>21 it's my understanding that Johnson &</p> <p>22 Johnson mixes -- has some fragrance</p> <p>23 added to the talc.</p> <p>24 I don't believe Imerys does</p> <p>25 that, but I don't know for sure.</p>
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<p>1 That opinion is based on data</p> <p>2 that is -- is -- the supporting data would</p> <p>3 indicate that it has to be a habit, routine,</p> <p>4 a chronic exposure. And so as a</p> <p>5 toxicologist, I've tried to put that in</p> <p>6 context.</p> <p>7 I don't know what else to tell</p> <p>8 you. That's the opinions I have formed to</p> <p>9 date.</p> <p>10 Q. A chronic -- a habit, routine,</p> <p>11 a chronic exposure for years?</p> <p>12 A. Well, chronic --</p> <p>13 MR. MEADOWS: Objection.</p> <p>14 THE WITNESS: -- is defined as</p> <p>15 years, typically, by a toxicologist,</p> <p>16 and so that's what I -- that's what I</p> <p>17 told you.</p> <p>18 QUESTIONS BY MS. BOCKUS:</p> <p>19 Q. Shifting to your regulatory</p> <p>20 opinions, you would agree that Imerys is a</p> <p>21 raw material supplier to J&J; is that</p> <p>22 correct?</p> <p>23 MR. MEADOWS: Objection.</p> <p>24 THE WITNESS: I would call them</p> <p>25 an ingredient supplier, yes.</p>	<p>1 So based on what I know -- I'm</p> <p>2 telling you what I know, and I would</p> <p>3 call them, again, an ingredient</p> <p>4 supplier, and I would call Johnson &</p> <p>5 Johnson a cosmetic manufacturer.</p> <p>6 Does that answer the question?</p> <p>7 QUESTIONS BY MS. BOCKUS:</p> <p>8 Q. It does.</p> <p>9 Would you agree that the</p> <p>10 minerals that you have identified in your</p> <p>11 report, that the documents that you have</p> <p>12 seen, would classify their -- to the extent</p> <p>13 that they are ever in the powder, that</p> <p>14 they're trace ingredients?</p> <p>15 MS. PARFITT: Objection.</p> <p>16 MR. MEADOWS: Objection.</p> <p>17 THE WITNESS: So which</p> <p>18 ingredients are you referring to?</p> <p>19 So some of the metals, no, are</p> <p>20 not trace ingredients.</p> <p>21 Are you talking about the --</p> <p>22 are you talking about the -- like the</p> <p>23 presence of tremolite or the presence</p> <p>24 of chrysotile --</p> <p>25</p>

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<p>1 QUESTIONS BY MS. BOCKUS: 2 Q. No. No, I'm sorry. I'm 3 talking about the three metals that you 4 identify in your report. Those are trace 5 elements that are -- that are sometimes 6 detected in the studies of the -- of the 7 talc. 8 MR. MEADOWS: Objection. 9 THE WITNESS: It's not how I 10 would say it. I would say they're 11 heavy metal components that are 12 naturally occurring within the product 13 that are sometimes -- sometimes 14 detectable at levels that are reported 15 as trace based on the detection limit 16 within the analysis, but at other 17 times they're not listed as trace. 18 They're actually listed with a 19 specific amount. 20 So that's what -- how I would 21 define what I call trace. Usually 22 that's how it will be reported in the 23 lab, trace, which means below the 24 limit of quantification, but it's 25 there. You're detecting it.</p>	<p>1 QUESTIONS BY MS. BOCKUS: 2 Q. Have you seen any studies where 3 women's blood has reflected the presence of 4 nickel or cobalt or chromium? 5 MR. MEADOWS: Objection. 6 QUESTIONS BY MS. BOCKUS: 7 Q. Who are parts of these 8 studies -- these ovarian cancer studies? 9 MR. MEADOWS: Objection. 10 THE WITNESS: The 11 epidemiological literature you're 12 asking me? 13 QUESTIONS BY MS. BOCKUS: 14 Q. Yes, ma'am. 15 A. It's possible in the Nurses' 16 Health Study that we can go to that, because 17 I know they do collect some heavy metal 18 levels. I've done that for other clients on 19 other issues. 20 Most of the others, I doubt 21 that we have heavy metal levels in blood. 22 But certainly there are levels of heavy metal 23 in blood, especially things like lead, for 24 example, that we have very limited capacity 25 to eliminate.</p>
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<p>1 I would agree that -- that 2 there are other descriptions of heavy 3 metals in the heavy metal literature 4 that talk about trace amounts being 5 found in -- naturally occurring in 6 food, for example, and I agree that 7 that does occur. But in the case of 8 this product, we actually have 9 often -- we actually have a -- a limit 10 that is set for acceptability in the 11 specification. 12 And so I would think it's more 13 proper to call it a level of the heavy 14 metal that is allowable by the purity 15 specifications set by the product. 16 And sometimes those levels may be 17 above, and most of the times those 18 levels are below, which is why it's 19 cleared. Because I've seen some 20 analyses where different products may 21 have been, I guess, turned away or 22 considered not acceptable based on the 23 analysis of certain types of minerals 24 or metals. 25</p>	<p>1 So whether or not you carry 2 around a significant body burden of a heavy 3 metal in your blood is somewhat driven by the 4 exposure pattern you get. It's something 5 that's commonly -- or can you excrete it 6 quickly or not. So... 7 Q. And are you familiar with any 8 studies that have suggested that the use of 9 body powders leads to a heavy burden of 10 nickel, chromium or cobalt in the blood? 11 A. So I have not seen such 12 analysis done, no, I have not. 13 Q. In paragraph 67 of your report, 14 which is on page 46 -- I'm sorry, on -- oh, 15 I'm sorry. Paragraph 64, I apologize. 16 A. No. No, that's fine. 17 Q. It's on page 44. 18 You cite to two abstracts -- 19 A. Yes. 20 Q. -- one by Fletcher and one by 21 Fletcher and Saed. 22 Do you consider these abstracts 23 to be reliable sources of data? 24 A. They're not as reliable at all 25 as a peer-reviewed article. So there's a</p>

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<p>1 difference in the weight you give an 2 abstract, absolutely. 3 However, knowing the papers 4 that Dr. Saed has actually published in the 5 peer-reviewed literature, I have -- I have 6 mentioned them in here because I do believe 7 that they are -- they are pieces of 8 information that are highly relevant to some 9 of the issues raised in other cellular 10 studies, and so that's why they're here. But 11 certainly I do not give them the same weight 12 as in my assessment of overall risk. 13 And I would say that I had the 14 same opinions on risk before I had these 15 studies. Because in my original reports, 16 obviously, I have gone further than risk and 17 talked about cause, and I didn't have the 18 Fletcher studies. 19 The Fletcher studies are more 20 on the issue of biologic plausibility and 21 mechanism versus being important 22 underpinnings, for example, for a hazard 23 assessment. 24 Q. Is there any way that someone 25 reading your report could tell that you</p>	<p>1 A. I attempted to do that. I 2 can't tell that you there isn't something in 3 here I've missed. But, yes, I read this 4 report six or seven times before I finalized 5 it, trying to make sure that the language I 6 was using was an accurate reflection of the 7 opinion I'm expressing. 8 But it's possible, if you want 9 to point to something that you want to ask me 10 about, I can tell you whether or not that was 11 something that I would change. 12 Q. So on page 77, paragraph 118 in 13 the middle of it, you say, "Based on the 14 knowledge available by the 1950s, talc body 15 powders manufactured and sold by Imerys and 16 Johnson & Johnson." 17 And that's the question that I 18 have for you. 19 A. I see what you're saying. 20 Q. Was Imerys selling anything to 21 Johnson & Johnson in the 1950s? 22 MR. MEADOWS: Objection. 23 THE WITNESS: I'm thinking. 24 It's possible they did not. That may 25 be true.</p>
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<p>1 attribute less weight to the abstracts by 2 Saed and Fletcher just by reading your 3 report? 4 MR. MEADOWS: Objection. 5 THE WITNESS: I don't know if 6 they could or not. Hopefully they 7 would based upon where they appear in 8 the report. They're not cited a lot 9 of other places, but they certainly 10 are cited. 11 So that's why I'm here today, 12 though. You're asking me these 13 questions; I'm telling you. That's 14 how I look at these studies. That's 15 all I can say. 16 I haven't -- I haven't, 17 certainly, as I've told you, given 18 things numerical weight throughout my 19 report. 20 QUESTIONS BY MS. BOCKUS: 21 Q. Looking at paragraph 118... 22 Well, when you were preparing 23 your report, were you careful with the 24 language that you used in it to be precise 25 and accurate?</p>	<p>1 QUESTIONS BY MS. BOCKUS: 2 Q. Well, and actually -- 3 A. You know what? When I wrote 4 this sentence, I assumed that they did, but 5 if that is not true, then certainly this 6 sentence should be just Johnson & Johnson. 7 Q. Well, earlier in your report, 8 in a footnote you indicate that Imerys began 9 supplying talc to Johnson & Johnson in 1989 10 or the late 1980s. 11 Do you remember making that 12 notation? 13 A. So let me look. So if that's 14 an inconsistency, then that should change. 15 Let me look. 16 Q. And that's all I want to know, 17 if it's an inconsistency, should it change. 18 A. If it is an inconsistency -- 19 certainly if Imerys was not selling talc to 20 Johnson & Johnson in 19 -- the 1950s, then -- 21 then certainly Johnson & Johnson's products 22 would not -- would not be affected by Imerys' 23 activity. 24 However, if Imerys is selling 25 talc to anyone that makes a consumer product</p>

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<p>1 in the 1950s, then -- or a precursor company</p> <p>2 to Imerys is making talc that's selling for</p> <p>3 body powder to somebody other than Johnson &</p> <p>4 Johnson, then that opinion would still hold.</p> <p>5 So -- but I certainly agree, I</p> <p>6 think I -- you're right, I think I have a</p> <p>7 statement about the link between the two in</p> <p>8 '89. So in that case, then certainly the --</p> <p>9 the link here would be related to Johnson &</p> <p>10 Johnson's products.</p> <p>11 Q. Okay. Yeah.</p> <p>12 A. Whether or not -- if they</p> <p>13 weren't sourced from Imerys, then that's a</p> <p>14 separate duty on a product, not this product.</p> <p>15 Q. If you look on the bottom of</p> <p>16 page 7, I think you'll see the footnote I was</p> <p>17 referencing.</p> <p>18 And with regard to your last</p> <p>19 answer, you don't have any information as to</p> <p>20 whether Imerys existed and, if it did,</p> <p>21 what -- who its customers were in 1950s,</p> <p>22 correct?</p> <p>23 A. I don't believe I do, no.</p> <p>24 MS. BOCKUS: I think that's all</p> <p>25 that I have. Thank you.</p>	<p>1 complete assessment the way I did, then I</p> <p>2 would agree that other people could come to a</p> <p>3 different conclusion, absolutely.</p> <p>4 So I think it depends what you</p> <p>5 mean by "reasonable scientist." But I would</p> <p>6 agree that individuals can look at the same</p> <p>7 body of data and, based on their judgment and</p> <p>8 experience, based on looking at that same</p> <p>9 body of data, could come to a different</p> <p>10 conclusion, yes. That's true.</p> <p>11 Q. You've been involved in this</p> <p>12 talc litigation for at least a couple of</p> <p>13 years, right?</p> <p>14 A. Yes.</p> <p>15 Q. And you know that various</p> <p>16 defendants have offered experts who disagree</p> <p>17 with your conclusions, right?</p> <p>18 A. Some of my conclusions, yes. I</p> <p>19 don't know that there is somebody that's in</p> <p>20 the litigation that does exactly what I do</p> <p>21 across all the opinions I've expressed, but,</p> <p>22 yes, certain parts of my opinions there are</p> <p>23 other experts I'm aware of, yes.</p> <p>24 Q. Well, they -- you're aware that</p> <p>25 there are defense experts who disagree with</p>
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<p>1 MR. LOCKE: I've got a few</p> <p>2 questions.</p> <p>3 EXAMINATION</p> <p>4 QUESTIONS BY MR. LOCKE:</p> <p>5 Q. Doctor, my name's Tom Locke. I</p> <p>6 represent the Personal Care Products Council.</p> <p>7 We met a couple of times before, I think.</p> <p>8 A. I apologize, I don't recall</p> <p>9 your name at least. The face looked</p> <p>10 familiar, though. I apologize.</p> <p>11 Q. I try to maintain a low</p> <p>12 profile.</p> <p>13 I have relatively few</p> <p>14 questions. I wanted to ask you overall about</p> <p>15 your opinion.</p> <p>16 Would you agree that reasonable</p> <p>17 scientists can disagree with your opinion</p> <p>18 that talc increases the risk of ovarian</p> <p>19 cancer?</p> <p>20 A. I'd say I wouldn't say it quite</p> <p>21 that way. I'd say that I agree that</p> <p>22 scientists can disagree on conclusions they</p> <p>23 draw, depending on the -- depending on the</p> <p>24 way that they have assessed.</p> <p>25 So certainly based on a</p>	<p>1 your opinion that talc increases the risk of</p> <p>2 ovarian cancer; is that correct?</p> <p>3 A. Yes, I -- I am aware of that</p> <p>4 fact.</p> <p>5 Q. And in your review of the</p> <p>6 records that go back or the scientific</p> <p>7 materials that go back 35 years or more,</p> <p>8 you've seen that there's disagreement</p> <p>9 regarding that issue; is that correct?</p> <p>10 A. So what documents are you</p> <p>11 referring to? Are you asking me about a</p> <p>12 specific -- just the published medical</p> <p>13 literature? Are you asking about documents</p> <p>14 like internal company documents, reviews by</p> <p>15 others? What are you asking me about?</p> <p>16 Q. Well, let's focus on the</p> <p>17 published medical literature.</p> <p>18 There are scientists who have</p> <p>19 disagreed with your opinion; is that correct?</p> <p>20 MS. PARFITT: Objection.</p> <p>21 THE WITNESS: I'm not aware of</p> <p>22 a paper in the published medical</p> <p>23 literature that has done the exact</p> <p>24 assessment I have done.</p> <p>25 So I am aware of the fact,</p>

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<p>1 however, that there are individual</p> <p>2 papers by scientists that, for</p> <p>3 example, have concluded that there is</p> <p>4 no association between exposure to</p> <p>5 talc perineally and ovarian cancer,</p> <p>6 yes. Individual papers, I am aware of</p> <p>7 that, but that's different than what I</p> <p>8 have done.</p> <p>9 QUESTIONS BY MR. LOCKE:</p> <p>10 Q. Let me just ask you about what</p> <p>11 you were requested to do on behalf of</p> <p>12 plaintiff's counsel.</p> <p>13 Plaintiff's counsel asked you</p> <p>14 to provide opinions related to the human</p> <p>15 health hazards posed by exposure to talcum</p> <p>16 powder products and how those hazards relate</p> <p>17 to the regulatory requirements for marketing</p> <p>18 cosmetic ingredients and cosmetic products in</p> <p>19 the United States; is that correct?</p> <p>20 MR. MEADOWS: Objection.</p> <p>21 THE WITNESS: I didn't write</p> <p>22 that, but that sounds like an accurate</p> <p>23 reflection of what -- what we -- what</p> <p>24 I have done at least in parts of my</p> <p>25 report, yes.</p>	<p>1 what I've been doing in the litigation.</p> <p>2 Q. Okay. As to that second</p> <p>3 bucket, the US regulatory requirements for</p> <p>4 marketing cosmetic ingredients and products,</p> <p>5 that's not relevant to the scientific</p> <p>6 question whether talc may cause ovarian</p> <p>7 cancer; am I right?</p> <p>8 A. No. I disagree with that based</p> <p>9 on the fact that a company that markets a</p> <p>10 cosmetic product is required to do a safety</p> <p>11 assessment. And if in that safety assessment</p> <p>12 issues relate to cancer or ovarian cancer and</p> <p>13 the use of talc, then those two things are</p> <p>14 related.</p> <p>15 But I would agree that -- that</p> <p>16 doing a risk assessment like I've done is a</p> <p>17 separate issue from doing a safety assessment</p> <p>18 for a product, because there's actually even</p> <p>19 a lesser standard for an issue of looking at</p> <p>20 a safety assessment for a product versus</p> <p>21 actually forming the opinion that there is an</p> <p>22 increased risk of cancer with exposure to</p> <p>23 talc.</p> <p>24 Q. Now, did IARC in 2006, did it</p> <p>25 look at the US regulatory process in</p>
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<p>1 QUESTIONS BY MR. LOCKE:</p> <p>2 Q. Well, if you look at your</p> <p>3 report, I think you go to part where you were</p> <p>4 asked to provide -- and I just pulled it from</p> <p>5 what you said.</p> <p>6 A. So I did write it, I apologize.</p> <p>7 It didn't sound like me.</p> <p>8 Q. It started with "to provide</p> <p>9 opinions related to the human health hazards"</p> <p>10 and so forth, so I just wanted to make sure</p> <p>11 we're clear on that.</p> <p>12 A. Sure.</p> <p>13 Q. So does that sound right in</p> <p>14 terms of what you were asked to do?</p> <p>15 A. I said I -- certainly those are</p> <p>16 the kinds of things that I was definitely</p> <p>17 asked to do. I was asked to do two basic --</p> <p>18 two basic things, which was having to do with</p> <p>19 toxicology and risk assessment, and then a</p> <p>20 separate issue related to regulatory</p> <p>21 concerns.</p> <p>22 So, yes, those are the two</p> <p>23 basic, I guess, buckets of information and</p> <p>24 documents that I reviewed and opinions I've</p> <p>25 expressed, and I think that's consistent with</p>	<p>1 considering whether talc may cause ovarian</p> <p>2 cancer?</p> <p>3 MR. MEADOWS: Objection.</p> <p>4 THE WITNESS: I don't think I</p> <p>5 understand what you mean. It's not a</p> <p>6 US regulatory process, no, if that's</p> <p>7 what you're asking me.</p> <p>8 They have a -- they have a</p> <p>9 discussion of what the products are,</p> <p>10 which is part of the way they're sold.</p> <p>11 But I don't think they're discussing</p> <p>12 the duty of a company under the</p> <p>13 regulatory process, no, that's a</p> <p>14 separate issue.</p> <p>15 QUESTIONS BY MR. LOCKE:</p> <p>16 Q. So their analysis of whether</p> <p>17 talc may cause ovarian cancer, that's</p> <p>18 different than the analysis of whether a</p> <p>19 company may have a duty, whatever that duty</p> <p>20 may be?</p> <p>21 MR. MEADOWS: Objection.</p> <p>22 THE WITNESS: It's a different</p> <p>23 process, absolutely. IARC is a</p> <p>24 separate, independent body that does</p> <p>25 an assessment looking at the issue of</p>

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<p>1 cancer hazard and looking at whether 2 or not there is sufficient evidence to 3 categorize that hazard, whereas a duty 4 of a company under the regulatory 5 situation is broader than just cancer 6 hazard; it's a whole different thing. 7 It's what you do internally before you 8 market a product. Totally different. 9 And so certainly when I -- 10 that's why I have separate sections in 11 my report, and that's why I even 12 have -- I've had discussions about the 13 difference between the regulatory 14 standard for warning versus the 15 assessment of risk that may be 16 required in order to start to produce 17 a -- identify a association or an 18 increased risk or even if you did a 19 causation analysis. Totally different 20 type of exercise. 21 QUESTIONS BY MR. LOCKE: 22 Q. Do you first, in that exercise, 23 look at the scientific issue of whether talc 24 may cause ovarian cancer? 25 A. Are you asking me in either of</p>	<p>1 this is a different assessment and 2 different standard. It's a much lower 3 standard on cosmetics for what needs 4 to be done as far as warning. 5 Now, when a company comes and 6 initiates a safety assessment on their 7 product, before they even think about 8 what am I going to warn, they should 9 be doing a comprehensive assessment of 10 safety based on what's available 11 publicly, knowing what others have 12 reported and then what data they've 13 collected. 14 If they don't have data at all 15 on the safety of the product, then the 16 product has to say that. We don't 17 know. We do not know if this product 18 is safe. And that's one of the things 19 that is allowed under FDA -- under FDA 20 regulations as well. 21 But essentially some -- some 22 assessment must be done to understand 23 from the perspective of the company 24 that this product is safe for 25 consumers to use as -- under the</p>
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<p>1 these exercises? 2 Q. Well, let's say when you're 3 getting to -- you mentioned the duty to warn. 4 So if you're looking at the duty to warn, do 5 you first have to look at does talc cause 6 ovarian cancer? 7 MR. MEADOWS: Objection. 8 THE WITNESS: That's not the 9 question you asked. No. I would 10 argue, based on the regulations, if 11 you look at the standard, the question 12 is, is there evidence to indicate that 13 there is a chance, there is a 14 potential -- not that it does, but is 15 there a potential for that type of 16 hazard to be posed to consumers who 17 use the product. 18 It's a possibility versus being 19 a -- I'm taking it beyond possibility 20 when I'm doing my assessment for 21 increased risk. And I talked about 22 that this morning, and I can't 23 remember her last name. The 24 Johnson -- I apologize. But I -- with 25 Johnson & Johnson. I talked about</p>	<p>1 directions of use. 2 So in the case of this, it 3 would be a body powder being used on 4 the body surface but also perineally 5 because -- because that was an 6 exposure pattern that was understood. 7 QUESTIONS BY MR. LOCKE: 8 Q. Okay. You described two 9 different buckets. They're independent 10 assessments; is that correct? 11 MR. MEADOWS: Objection. 12 THE WITNESS: Initially that's 13 where I started, and now I'm talking 14 two different duties. There's a duty 15 to warn, but there's first a duty to 16 collect information before you market 17 it. It's your premarket safety 18 assessment. 19 QUESTIONS BY MR. LOCKE: 20 Q. Okay. I'm not actually talking 21 about the manufacturer's duty. I wanted to 22 just first address your scientific analysis. 23 That's a separate question that 24 led you to your opinion on the -- your 25 opinion that talc increases the risk of</p>

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<p>1 ovarian cancer, correct?</p> <p>2 MR. MEADOWS: Objection.</p> <p>3 THE WITNESS: Yes, that's what</p> <p>4 I described. And I thought you were</p> <p>5 talking about duty of the company, and</p> <p>6 so I apologize. I didn't mean to go</p> <p>7 off on a tangent.</p> <p>8 If you want to focus just on</p> <p>9 the risk assessment -- is that what</p> <p>10 you want to do? -- that's what I'm</p> <p>11 doing.</p> <p>12 QUESTIONS BY MR. LOCKE:</p> <p>13 Q. No, I just want to understand,</p> <p>14 those are two different things, though,</p> <p>15 right?</p> <p>16 A. Those are two different --</p> <p>17 those are two different tasks that I</p> <p>18 undertook, yes. I undertook a risk</p> <p>19 assessment task to form opinions based on</p> <p>20 what I can say about risk, and then I</p> <p>21 separately -- and I had done this earlier on</p> <p>22 the issue of warnings, looking at what do we</p> <p>23 know about the product and whether or not --</p> <p>24 and when did we know it, and what should</p> <p>25 consumers have been warned about based on the</p>	<p>1 also sort of -- that's a piece along the way</p> <p>2 to doing a causation analysis, but it's not</p> <p>3 the same.</p> <p>4 Q. Your opinion regarding the</p> <p>5 FDA's responsibilities and functions, that's</p> <p>6 not related to your opinion that talc may</p> <p>7 cause an increased risk in ovarian cancer; is</p> <p>8 that correct?</p> <p>9 MR. MEADOWS: Objection.</p> <p>10 THE WITNESS: I don't think</p> <p>11 that's true the way you're asking that</p> <p>12 question, because I don't know how you</p> <p>13 divorce the fact that as a -- in a</p> <p>14 regulatory assessment, if I identify</p> <p>15 cancer hazard, I have identified a</p> <p>16 duty to warn. That's certainly</p> <p>17 something that should be warned about</p> <p>18 when I understand that there's not</p> <p>19 only the potential, but I believe</p> <p>20 there's an increased risk.</p> <p>21 But I would agree with you that</p> <p>22 in my report, I'm laying out for you</p> <p>23 even different bodies of information</p> <p>24 that -- as I step through it.</p> <p>25 Does that make sense to you?</p>
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<p>1 safety information that was available over</p> <p>2 time.</p> <p>3 Q. The risk assessment task,</p> <p>4 that's what you mean by your analysis that</p> <p>5 talc increases the risk of ovarian cancer?</p> <p>6 A. That's correct.</p> <p>7 Q. You could have stopped at that,</p> <p>8 but then you performed an additional task; is</p> <p>9 that right?</p> <p>10 A. Well, actually, no, because the</p> <p>11 first task I actually started with was the</p> <p>12 regulatory task. When I first started</p> <p>13 getting involved in the litigation very --</p> <p>14 before I wrote my first report, one of the</p> <p>15 first things I was looking at was the issue</p> <p>16 of the duty of the manufacturer to provide</p> <p>17 warnings.</p> <p>18 And then after that, I expanded</p> <p>19 that role to be an inclusion as well of a</p> <p>20 causation analysis.</p> <p>21 And then now I'm not doing a</p> <p>22 full causation analysis in this litigation,</p> <p>23 but I'm using essentially some of the same</p> <p>24 information to provide you with a description</p> <p>25 of a -- a health risk assessment, which was</p>	<p>1 QUESTIONS BY MR. LOCKE:</p> <p>2 Q. Not really.</p> <p>3 A. I'm sorry.</p> <p>4 Q. I'm talking about your</p> <p>5 scientific analysis here, not your regulatory</p> <p>6 analysis.</p> <p>7 To do your scientific analysis,</p> <p>8 you looked at scientific materials, right?</p> <p>9 A. Yes, but I do the same thing</p> <p>10 for my regulatory analysis. That's why I'm</p> <p>11 confused. I -- to me they are connected.</p> <p>12 But I would agree with you, I</p> <p>13 had an analysis. Let's just talk about that,</p> <p>14 my analysis on risk assessment and my</p> <p>15 opinions that I've expressed. Those are laid</p> <p>16 out in a separate section of my report,</p> <p>17 absolutely. So we could talk about that if</p> <p>18 you'd like.</p> <p>19 Q. Well, I just want to</p> <p>20 understand, and I think I do now, that's a</p> <p>21 separate issue from your regulatory opinion?</p> <p>22 A. It's not a separate issue.</p> <p>23 That's where I'm having trouble with your</p> <p>24 language.</p> <p>25 It's a separate task because,</p>

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<p>1 for example, I may have only been asked, but 2 I wasn't, to just describe whether or not, as 3 a human risk assessor and toxicologist, there 4 is a hazard or a risk posed by the product, 5 and I could stop there. 6 But I was asked, based on -- 7 based on my experience working in the area of 8 regulatory toxicology but also on regulatory 9 issues for clients where I give advice, I was 10 asked to look at how does that scientific 11 information impact what the company should be 12 doing. 13 And so that's -- that's why I'm 14 saying you can't divorce them, because the 15 warning issue I'm talking about is intimately 16 tied into the human health risk assessment 17 results. 18 Q. So do you consider yourself 19 primarily here as a warning expert? 20 MR. MEADOWS: Objection. 21 THE WITNESS: I consider that 22 one of my roles, yes, absolutely. 23 It depends upon how individual 24 cases, individual attorneys, will -- 25 will ask -- decide to use me. For</p>	<p>1 But I practice in both those areas in 2 my consulting practice and in my 3 experience. 4 QUESTIONS BY MR. LOCKE: 5 Q. Let me ask you a few questions 6 about your cosmetic ingredient review 7 statements, CIR. 8 We can agree to call it that, 9 right? 10 A. Yes, that's fine. 11 Q. In parts of your report, you 12 cite the CIR as an authoritative source on 13 cosmetic ingredients; is that correct? 14 A. So where are you looking at, 15 the background information on the CIR? 16 Yes, they certainly are a 17 source of information that FDA relies upon as 18 far as assessments, yes, that's true. 19 Q. Well, and on page -- or 20 paragraph 35, page 23, you cite to the CIR 21 on, for example, chemicals purportedly in 22 cosmetics. You have a footnote there. 23 A. So -- 24 Q. I believe it's footnote 31. 25 A. Yes, I have looked at -- looked</p>
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<p>1 example, I have been used in one trial 2 to only talk about the toxicology. 3 Other trials, I've talked about 4 toxicology as well as regulatory 5 issues. So I think it just depends on 6 the case. 7 In the MDL, I am prepared, 8 however, to come to talk at a trial on 9 the regulatory system that guides 10 cosmetics as well as provide opinions 11 that talk about what are the hazards 12 of talc, what is the toxicology of 13 talc, what do -- how can you be 14 exposed to talc, that migration issue, 15 and then my opinions about whether or 16 not I believe that there is an 17 increased risk of ovarian cancer. 18 So I would be -- be prepared to 19 talk about both of those things. 20 That's why I said I do think I'm a 21 little different than some of the 22 other experts that you may encounter, 23 for example, in the defense side, 24 where someone may just do regulatory 25 or somebody may just do toxicology.</p>	<p>1 at the CIR as a source of information because 2 many of the chemicals, many of the 3 ingredients within the fragrance of Johnson & 4 Johnson, the only available information may 5 be found within the CIR that's publicly 6 available. 7 Q. And you rely on the report of 8 Dr. Cralley; is that correct? 9 MR. MEADOWS: Objection. 10 MS. PARFITT: Objection. 11 QUESTIONS BY MR. LOCKE: 12 Q. You reference Appendix D to 13 your report. I believe if you stay on the 14 same page you'll see that, the same 15 paragraph. 16 A. I wouldn't say I rely on the 17 report of Dr. Cralley because I form my 18 opinions independent of Dr. Cralley, but 19 certainly his -- I believe if you go to his 20 reports, his report is supportive of my 21 opinions in this area. 22 Q. Did you read his report? 23 A. I have read it now, but I did 24 not read it before I -- before I formed my 25 opinions in this particular paragraph, yes.</p>

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<p>1 Q. I'm a little confused because</p> <p>2 you're citing to his report.</p> <p>3 You read it or you didn't read</p> <p>4 it before you wrote this paragraph?</p> <p>5 A. I read it before I wrote the</p> <p>6 paragraph. I didn't read it before I had</p> <p>7 formed the opinion. Do you understand what</p> <p>8 I'm saying?</p> <p>9 I did my review of the irritant</p> <p>10 chemicals independently before I looked at</p> <p>11 Dr. Cralley's report. So I had formed the</p> <p>12 opinion that -- of the chemicals I had</p> <p>13 searched for that this is what I identified.</p> <p>14 And that's what this is talking about, right?</p> <p>15 I'm saying here that of the</p> <p>16 more than 100 chemicals included, over</p> <p>17 70 percent are compounds linked with some</p> <p>18 level of irritant hazard. That was done on</p> <p>19 my own.</p> <p>20 Then, if you go to look at</p> <p>21 Dr. Cralley's report, I cite it here because</p> <p>22 it's consistent. That is, his report</p> <p>23 provides support additionally for the</p> <p>24 statement I'm making.</p> <p>25 So I'm not relying on his</p>	<p>1 is no other source available.</p> <p>2 Q. Okay. In your report you state</p> <p>3 that the CIR process is administered</p> <p>4 independent of the FDA.</p> <p>5 But the FDA is on the CIR</p> <p>6 steering committee; is that correct?</p> <p>7 A. That is correct.</p> <p>8 Q. You don't mention that in your</p> <p>9 report, although you mention others who were</p> <p>10 on the CIR steering committee, correct?</p> <p>11 A. Yes, there's a paragraph where</p> <p>12 I talk about others, yes.</p> <p>13 Q. But you don't mention that the</p> <p>14 FDA is on the steering committee?</p> <p>15 A. I believe I -- I believe I've</p> <p>16 been asked that question before, and I said</p> <p>17 yes, but certainly in this report I don't</p> <p>18 believe I state that, that is true.</p> <p>19 Q. CIR solicits input from the</p> <p>20 public; is that correct?</p> <p>21 MS. PARFITT: Objection.</p> <p>22 THE WITNESS: I would say they</p> <p>23 solicit input from industry, yes.</p> <p>24 QUESTIONS BY MR. LOCKE:</p> <p>25 Q. Well --</p>
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<p>1 conclusions to make my opinion, but it's</p> <p>2 certainly -- I am citing it here as it being</p> <p>3 a piece of evidence that is consistent with</p> <p>4 my opinions.</p> <p>5 Q. Sorry, I seem to have messed up</p> <p>6 my microphone. I'll try to hold it for a</p> <p>7 little bit then.</p> <p>8 Do you disagree with</p> <p>9 Dr. Cralley's report?</p> <p>10 A. I have not formed an opinion</p> <p>11 that I agree or disagree. He -- with his --</p> <p>12 I believe he has information that is</p> <p>13 consistent with the opinion I'm expressing in</p> <p>14 the sentence, however.</p> <p>15 Q. And do you know that</p> <p>16 Dr. Cralley repeatedly cites to the CIR as an</p> <p>17 authoritative source regarding cosmetic</p> <p>18 ingredients?</p> <p>19 A. I don't know that he uses that</p> <p>20 exact language, but he does cite to it, yes,</p> <p>21 in his report. Certainly he does.</p> <p>22 Q. More than 20 times, right?</p> <p>23 A. That, I have not counted. I</p> <p>24 can't tell you that. But he does, just like</p> <p>25 I do, as a source of information when there</p>	<p>1 A. But they -- and they do have a</p> <p>2 public comment period, which is mainly input</p> <p>3 from industry.</p> <p>4 But I agree that they do -- and</p> <p>5 if what you're referring to is a public</p> <p>6 comment period, yes, there is that for the</p> <p>7 documents.</p> <p>8 Q. You can go on the website and</p> <p>9 see what ingredients CIR is going to review,</p> <p>10 right?</p> <p>11 A. Yes, you can.</p> <p>12 Q. Have you done that?</p> <p>13 A. Yes, I've done it many times</p> <p>14 before.</p> <p>15 Q. Okay. And did you submit</p> <p>16 comments on talc in 2012?</p> <p>17 A. No, I did not.</p> <p>18 Q. Okay. You could -- the public</p> <p>19 can submit comments many times during the</p> <p>20 process of an ingredient review; is that</p> <p>21 correct?</p> <p>22 A. There are different --</p> <p>23 different stages of the draft document. Is</p> <p>24 that what you're asking me? Yes, that can be</p> <p>25 done.</p>

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<p>1 Q. Well, even before it's a draft, 2 CIR is soliciting information about the 3 ingredient to include in the initial 4 materials provided to the expert panel; isn't 5 that correct? 6 A. Technically I believe that is 7 true, but I would disagree that that is 8 something that happens routinely. But I 9 would agree that -- I would say technically 10 you may be -- that is something that could 11 occur, yes, but that is not the situation, 12 for example, in the case of talc. 13 Q. Why not? 14 A. Based upon what I have seen 15 described as how the review was done, and 16 that has to do with the testimony of 17 different -- or different documents that I've 18 reviewed and the testimony of individuals 19 related to this document. 20 Q. Well, Dr. Cramer could have 21 submitted comments to the CIR regarding talc, 22 couldn't he? 23 MR. MEADOWS: Objection. 24 MS. PARFITT: Objection. 25 THE WITNESS: You'd have to ask</p>	<p>1 submitted. 2 Q. And CIR meetings are open to 3 the public, right? 4 A. That is true, they are open to 5 the public, but in my experience it -- they 6 are not meetings that are heavily attended by 7 the public but indeed are -- tend to be 8 meetings attended by industry stakeholders 9 within the ingredients that are being 10 reviewed. 11 Q. You know Mr. Steinberg here. 12 He was a plaintiff's expert for a while? 13 A. I don't know him personally, 14 but I know his name and I know he was a 15 plaintiff's expert, yes. 16 Q. You know he attended the talc 17 meeting, right? 18 A. Yes, I believe he was working 19 with indus -- he works with industry, so I 20 believe indeed he did attend that meeting. 21 Q. You're not claiming he was 22 working with any industry member regarding 23 talc, are you? 24 A. That's not what I stated. I 25 know he's a consultant to the cosmetic</p>
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<p>1 Dr. Cramer if he was aware that they 2 were reviewing it. I can't answer 3 that for Dr. Cramer. 4 But if he was aware of it, 5 certainly -- if you're aware of the 6 process going on and the timing of it, 7 certainly you can submit comments. 8 I'm not disagreeing with you on that. 9 That is true. 10 QUESTIONS BY MR. LOCKE: 11 Q. CIR publishes in advance what 12 it's going to review; isn't that correct? 13 A. What is coming up for review? 14 Q. Yes. 15 A. Yes, things that are proposed 16 for the next meeting, yes, that's true. 17 Q. And you could submit comments 18 to the first draft of the CIR report; isn't 19 that correct? 20 A. I would agree that that is 21 possible to happen, yes. 22 Q. And you can submit comments 23 before the final report is drafted, correct? 24 A. Yes, as long as it's still in 25 draft form, yes, those comments can be</p>	<p>1 industry, so it doesn't surprise me. And I 2 believe he lives in the area, so it doesn't 3 surprise me that he attended. 4 I haven't spoken to him about 5 any of that, though, so I have no specific 6 details of that. 7 Q. Transcripts of the meeting are 8 available to the public, right? 9 A. You can download the 10 transcripts, yes. 11 Q. They're on the website? 12 A. That's what I said. You can 13 download. I'm sorry. 14 Q. Okay. 15 A. Yes, you can download them from 16 the website. 17 Q. Did you submit comments to the 18 CIR regarding talc? 19 A. No, I did not. 20 Q. Why not? 21 A. I wasn't aware of the process 22 that was going on in the draft form at the 23 time. 24 Q. Why is that? 25 A. I was not following the CIR for</p>

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<p>1 talc at that particular time. I have a lot 2 of other clients and a lot of other issues 3 that go on on a routine basis, and I -- I 4 literally would not have time to follow every 5 assessment they do, considering that they do 6 thousands of chemicals. 7 Q. Did you know of the CIR prior 8 to your retention by plaintiff's counsel? 9 A. Yes. In fact, I -- one of the 10 journals that I receive, International 11 Journal of Toxicology, maybe, publishes many 12 of their safety assessments. So I certainly 13 am, yes. 14 I was aware -- when I was at 15 Evirion, I was aware of the existence of CIR. 16 Q. Have you ever provided prior to 17 this litigation -- and by "this litigation" I 18 mean any aspect of the talc litigation -- an 19 expert opinion on cosmetics' ingredients? 20 A. You're asking me in any other 21 litigation on a cosmetic ingredient? 22 I'm thinking back to the cases 23 I've worked on. Not as a -- not as a 24 testifying expert. 25 At Evirion, though, we worked on</p>	<p>1 same level of review of any of these 2 ingredients as can be provided -- as was 3 provided by the IARC. 4 And so, again, that's one of 5 the comparisons I'm doing. I'm talking about 6 the difference in the time, the effort, the 7 difference in the independence of the 8 reviews. And so that -- when I'm talking 9 about, those numbers, that's what I'm 10 focusing on. I'm focusing on the fact that 11 you have so many reviews in a very short 12 period of time, with a one-expert panel, it's 13 impossible for that level of analysis and 14 review to be anywhere near what IARC panels 15 do, and also nowhere near the level of review 16 that I have done based on the number of 17 documents that I have analyzed and looked at. 18 So it's a different type of review. 19 Q. Let me ask you a few questions 20 because you have criticized the panel. 21 You would agree with that, 22 correct? 23 A. Yes. Oh, absolutely. This 24 particular analysis I have. I have made some 25 general criticisms of the overall process,</p>
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<p>1 litigation involving cosmetic ingredients, 2 thought I was not the testifying expert. 3 Q. In your report you talk about 4 the percentage of -- or the number of 5 ingredients that the CIR listed as unsafe. 6 Do you recall that? 7 A. Yes. I mean, if you want me to 8 verify the number, I need to go there. But, 9 yes. 10 Q. You don't mention that CIR has 11 put limitations on approximately 50 percent 12 of the ingredients that it has reviewed, do 13 you? 14 A. I don't mention that, but they 15 do. They have -- they have -- when they have 16 a statement about safety, they will -- they 17 will often talk about the limitations from 18 the safe use based on either concentration or 19 even maybe route of exposure, that is true. 20 Q. Why don't you do that? Why 21 didn't you include that in your report? 22 A. No particular reason. I mean, 23 the point I'm trying to make is really the 24 workload that's going on here and the 25 impossibility of the task of providing the</p>	<p>1 and then I made some specific criticisms of 2 this particular review. 3 Q. And one of your criticisms is 4 that the CIR -- I think you said two CIR 5 expert panelists had conflicts of interest; 6 is that correct? 7 A. Yes, that -- they did, that 8 were not -- that were not -- I believe not 9 understood even by Dr. Andersen at that time. 10 I think these are things brought up to him 11 that he was not aware of. 12 Q. All right. Now, you read his 13 testimony in one of the trials in California, 14 right? 15 A. Yes, that's the -- in fact, 16 that's the source of the information where 17 I'm citing to those names of those 18 individuals. I think I refer to that, his 19 trial testimony. 20 Q. And didn't he, though, say, 21 well, he didn't view it as a conflict of 22 interest because the money wasn't going to 23 them personally, it was going to their 24 organizations? 25 A. He did make that statement,</p>

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<p>1 yes.</p> <p>2 Q. And you disagree with that</p> <p>3 statement?</p> <p>4 A. I don't -- I mean, his</p> <p>5 testimony is what it is.</p> <p>6 Are you asking me do I disagree</p> <p>7 that that's a conflict of interest?</p> <p>8 I disagree that you shouldn't</p> <p>9 disclose that as a potential conflict in the</p> <p>10 documents that are produced, just like I do</p> <p>11 when I write an article and I disclose that</p> <p>12 I've had funding. I don't say what the</p> <p>13 funding specifically paid for, but I've had</p> <p>14 funding or support from this industry</p> <p>15 individual or that industry individual.</p> <p>16 It's -- it's something that just is about</p> <p>17 transparency.</p> <p>18 Q. So when you write articles, you</p> <p>19 say that you've been paid a lot of money by</p> <p>20 plaintiffs' lawyers?</p> <p>21 MR. MEADOWS: Objection.</p> <p>22 MS. PARFITT: Objection.</p> <p>23 THE WITNESS: Well, I haven't</p> <p>24 written an article that overlaps with</p> <p>25 an issue that I've addressed in</p>	<p>1 from an industry or a company that has</p> <p>2 to do with the issue you're looking</p> <p>3 at, yes, a conflict -- a conflict of</p> <p>4 interest absolutely needs to be</p> <p>5 described.</p> <p>6 QUESTIONS BY MR. LOCKE:</p> <p>7 Q. And that would -- well, let me</p> <p>8 just ask you: You're not an ethicist, are</p> <p>9 you?</p> <p>10 A. No, I'm not trained as an</p> <p>11 ethicist.</p> <p>12 Q. And you're not a lawyer, are</p> <p>13 you?</p> <p>14 A. Well, no, but I have passed the</p> <p>15 patent bar, but I'm not trained as a lawyer.</p> <p>16 Q. That doesn't make you an</p> <p>17 ethicist, right?</p> <p>18 A. No, it does not.</p> <p>19 Q. Okay. Let's talk about one of</p> <p>20 the people you criticized, Dr. Wilma</p> <p>21 Bergfeld.</p> <p>22 Did you know she was the first</p> <p>23 woman who was the president -- to be the</p> <p>24 president of the American Academy of</p> <p>25 Dermatology?</p>
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<p>1 plaintiffs' litigation, but I</p> <p>2 certainly have given my conflict of</p> <p>3 interest statements that relate to the</p> <p>4 issue in the article.</p> <p>5 I do that -- I've done that</p> <p>6 with -- on my work -- several of my --</p> <p>7 several of my assessments talking</p> <p>8 about risks of pesticides. I've done</p> <p>9 it with the work that I've done that</p> <p>10 that's been sort of, I guess,</p> <p>11 policy-type work on behalf of the</p> <p>12 American Chemistry Council.</p> <p>13 So absolutely I do.</p> <p>14 QUESTIONS BY MR. LOCKE:</p> <p>15 Q. Okay. You don't think it's</p> <p>16 relevant that you receive 50 percent of your</p> <p>17 money solely from plaintiffs' products</p> <p>18 liability lawyers?</p> <p>19 MR. MEADOWS: Objection.</p> <p>20 MS. PARFITT: Objection. Form.</p> <p>21 THE WITNESS: If it has nothing</p> <p>22 to do with the issue that I'm</p> <p>23 addressing in the paper, no, I do not</p> <p>24 think that.</p> <p>25 But when you're accepting money</p>	<p>1 A. No, I don't know her</p> <p>2 personally, so, no, I did not know that.</p> <p>3 Q. Did you investigate her at all</p> <p>4 when you criticized her?</p> <p>5 A. I wasn't criticizing her, I was</p> <p>6 criticizing the CIR process for failing to</p> <p>7 disclose the conflicts of interest of</p> <p>8 individuals that were involved in their</p> <p>9 assessment.</p> <p>10 I certainly am not giving</p> <p>11 personal criticism to either of those</p> <p>12 individuals.</p> <p>13 Q. You would agree that the</p> <p>14 American Academy of Dermatology is a</p> <p>15 reputable organization?</p> <p>16 A. I haven't formed an opinion one</p> <p>17 way or the other; however, I'm aware of them,</p> <p>18 and certainly I know individuals that are</p> <p>19 members of it, yes.</p> <p>20 Q. Are those individuals reputable</p> <p>21 people?</p> <p>22 MS. PARFITT: Objection.</p> <p>23 THE WITNESS: They are people</p> <p>24 that practice medicine that certainly</p> <p>25 I would go see. I mean, you're asking</p>

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<p>1 me if I formed a very specific opinion</p> <p>2 about them as individuals, and I</p> <p>3 haven't done that.</p> <p>4 QUESTIONS BY MR. LOCKE:</p> <p>5 Q. Do you have any reason to</p> <p>6 believe that the American Academy of</p> <p>7 Dermatology is disreputable?</p> <p>8 A. No. Again, I haven't formed an</p> <p>9 opinion one way or the other. I'm aware of</p> <p>10 the organization, and it certainly is one</p> <p>11 that is -- has within its members a number of</p> <p>12 people that I know that practice in</p> <p>13 dermatology.</p> <p>14 Q. Did you know that Dr. Bergfeld</p> <p>15 was the first woman to be president of the</p> <p>16 Cleveland Academy of Medicine?</p> <p>17 A. To the what? What was the</p> <p>18 first word?</p> <p>19 Q. Cleveland Academy of Medicine?</p> <p>20 A. No. Again, I'm not aware of</p> <p>21 her CV specifically, other than what may have</p> <p>22 been discussed -- it's possible her -- I know</p> <p>23 her affiliation will be listed in some of the</p> <p>24 documents as to where she is today, but I do</p> <p>25 not know her CV and her history.</p>	<p>1 and also gynecological -- gynecological</p> <p>2 sciences on the issue of migration.</p> <p>3 Q. You're not a epidemiologist,</p> <p>4 are you?</p> <p>5 A. Not by training. It's a tool I</p> <p>6 use all the time, but I'm not an</p> <p>7 epidemiologist by training.</p> <p>8 Q. And panel members on the CIR,</p> <p>9 they might have used the same tool that</p> <p>10 you're using to form your opinion about talc,</p> <p>11 correct?</p> <p>12 MR. MEADOWS: Objection.</p> <p>13 THE WITNESS: Based on what</p> <p>14 I've reviewed from the minutes and the</p> <p>15 write-up, I would disagree that that</p> <p>16 is -- they have done -- they've used</p> <p>17 the tools in the same way I have. I</p> <p>18 disagree with that.</p> <p>19 QUESTIONS BY MR. LOCKE:</p> <p>20 Q. No, but I'm saying their</p> <p>21 epidemiology could be the same background</p> <p>22 that you have. You haven't reviewed who they</p> <p>23 are, so you really don't really know.</p> <p>24 MR. MEADOWS: Objection.</p> <p>25 THE WITNESS: Well, I do</p>
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<p>1 Q. Are you aware that she was the</p> <p>2 first president -- or she was a president of</p> <p>3 the American Society of Dermatopathology?</p> <p>4 A. No. Same thing. If I'm not</p> <p>5 aware of her CV, I wouldn't know that.</p> <p>6 Q. How about that she was the</p> <p>7 former chair to the FDA's drug -- FDA's</p> <p>8 Dermatology and Ophthalmology Advisory</p> <p>9 Committee?</p> <p>10 A. Same answer. I don't know her</p> <p>11 CV, so I have no knowledge.</p> <p>12 Q. Is it your opinion that</p> <p>13 Dr. Bergfeld was not qualified to chair the</p> <p>14 CIR panel that considered talc?</p> <p>15 A. I don't think I formed that</p> <p>16 specific opinion. Instead, what I have --</p> <p>17 the opinions I formed relate to the overall</p> <p>18 makeup of the panel that failed to include</p> <p>19 individuals with expertise that were -- that</p> <p>20 are really key to assessing the safety of</p> <p>21 talc. And that had to do with the issues of,</p> <p>22 as I discuss it, epidemiology -- oh, I'm</p> <p>23 sorry, I think I need to put this back --</p> <p>24 period -- sorry. In the area of epidemiology</p> <p>25 is one that I talked about it specifically,</p>	<p>1 know -- I do know Dr. Klaassen, who I</p> <p>2 believe was on the panel as a</p> <p>3 toxicologist. He is not somebody</p> <p>4 that -- he is not somebody that I</p> <p>5 understand does a significant amount</p> <p>6 of evaluation in risk assessment for</p> <p>7 epidemiological studies. He has done</p> <p>8 some of that, yes, I agree, but it's</p> <p>9 different training than mine.</p> <p>10 QUESTIONS BY MR. LOCKE:</p> <p>11 Q. You're better qualified than he</p> <p>12 is?</p> <p>13 A. No, that's not what I'm saying.</p> <p>14 I'm saying it's different background.</p> <p>15 The question that I heard you</p> <p>16 ask me, I believe, was directed towards the</p> <p>17 differences in my background versus somebody</p> <p>18 else's.</p> <p>19 And I'm saying that I'm not</p> <p>20 aware that he has the same background I do,</p> <p>21 but there is not -- there was not somebody on</p> <p>22 the panel that had specific expertise and</p> <p>23 analysis of epidemiological studies as an</p> <p>24 epidemiologist. And I think that's important</p> <p>25 in this case where you're analyzing in a</p>

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<p>1 causation analysis a wide variety of studies. 2 So I do think it's important. 3 Q. You're not a gynecological 4 oncologist, are you? 5 A. No, I'm not. But again, that 6 would have been an important expertise to 7 have on the panel when -- 8 Q. And yet you formed your opinion 9 with -- 10 MR. MEADOWS: Hold on. 11 MR. LOCKE: No. No. Go ahead. 12 You can ask follow-up questions 13 if you want. 14 MR. MEADOWS: You're 15 interrupting her. 16 MR. LOCKE: Well, I've got a 17 limited amount of time, and I've got 18 to keep moving. 19 MR. MEADOWS: Well -- 20 MR. LOCKE: They're very long 21 answers to questions that I'm not 22 asking. So I -- you follow up if you 23 would like with your questions, but I 24 got to keep moving. 25 MR. MEADOWS: Well, I'm sorry,</p>	<p>1 I'm sorry. 2 Q. The FDA frequently seeks 3 information, scientific information, from 4 cosmetic manufacturers; is that correct? 5 A. I don't understand what you 6 mean by "frequently seeks." They rely on 7 cosmetic manufacturers to do their own safety 8 assessments. 9 Is that what you're referring 10 to? 11 Q. Well, they ask PCPC to comment 12 on scientific issues, correct? 13 A. Yes, I would agree that that 14 interaction has happened, but that's not 15 where the responsibility lies. But I agree, 16 they have. 17 Q. I'm not asking about 18 responsibility. I'm asking: Has the FDA 19 asked cosmetic manufacturers for scientific 20 information? 21 A. Yes, they have in this case. I 22 discuss some of that, yes. 23 Q. And they do that frequently, 24 right? Not just in this case, but generally? 25 A. I can't answer that for all</p>
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<p>1 but you're not going to be allowed to 2 interrupt her. 3 MR. LOCKE: Okay. Then we'll 4 go longer. If she's going to answer 5 questions I'm not asking, then I need 6 to go -- I need to be able to go 7 longer. 8 MR. MEADOWS: You're not going 9 to be allowed to interrupt her. 10 That's just the bottom line. 11 QUESTIONS BY MR. LOCKE: 12 Q. You're not a gynecological 13 oncologist, right? 14 A. I'm not trained as a 15 gynecologic oncologist, that is true. 16 Q. You're not a medical doctor, 17 correct? 18 A. I am not a physician, that is 19 correct. 20 Q. Let's talk about the citizens 21 petition. 22 The FDA frequently seeks 23 scientific information from cosmetic 24 manufacturers; is that correct? 25 A. First part of the question?</p>	<p>1 situations. I have seen it happen before, 2 yes. 3 Q. The FDA asked, for example, for 4 then CTFA to cosponsor the 1994 workshop on 5 talc, correct? 6 A. Yes, they did. 7 Q. The FDA knew that the report 8 prepared by Dr. Huncharek and Dr. Muscat was 9 based on PCPC's retention of those 10 consultants, correct? 11 A. So what are you -- what time 12 period are you talking about? 13 Q. Well, now, there was only one 14 time that Drs. Huncharek and Muscat submitted 15 a report to the FDA regarding talc, correct? 16 A. So I need to look to confirm 17 that. Which time period are you talking 18 about? 19 Q. 2009. Citizens petition. 20 A. Oh, that is true. In the 21 citizens petition, that is true, yes. But 22 I -- but... 23 Q. I mean, it says in the letter, 24 "We're submitting a report written by Drs. 25 Huncharek and Muscat," correct?</p>

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<p>1 A. In the cover letter from the 2 CRE? 3 Q. From -- not CRE, from PCPC. 4 A. Okay. So let -- I need to -- I 5 need to refresh my memory on the way the 6 submissions were made. I apologize. 7 Do you remember which paragraph 8 that you're referring to? 9 Q. Well, it's throughout your 10 report you're talking about the citizens 11 petition. 12 A. So it's my recollection, based 13 upon the documents that I have seen, that it 14 was not a transparent process at all times 15 that Drs. Huncharek and Muscat were being 16 identified as independent consultants and 17 were not ones that were being actually paid 18 by the industry for some of the work that 19 they did. And I think that's discussed in my 20 report. 21 Q. Well, let's break that down. 22 A. If you want me to confirm the 23 issue of the 2009 -- if you will point me to 24 where you say I discuss this, I will confirm 25 that or not.</p>	<p>1 Q. And you're not aware of any 2 other document indicating that PCPC ever 3 hired Drs. Huncharek or Muscat? 4 A. So that's where I'll need to go 5 back and look at the documents, because -- 6 that I have discussed. So I need to find 7 that on my paragraph. 8 If you want to go off the 9 record for a minute so I don't waste your 10 time, I will look. 11 Q. Sure. 12 A. It's up to you. Or we can stay 13 on the record. 14 MR. LOCKE: I'm fine going off. 15 VIDEOGRAPHER: We are going off 16 the record at 4:23 p.m. 17 (Off the record at 4:23 p.m.) 18 VIDEOGRAPHER: We are back on 19 the record at 4:25 p.m. 20 QUESTIONS BY MR. LOCKE: 21 Q. The question I asked: Are you 22 aware of any other document indicating that 23 PCPC ever hired Dr. Huncharek and Muscat 24 other than for the 2009 response or 25 submission to the citizens petition?</p>
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<p>1 Q. Well, let me break it down. 2 Citizens petition submitted in 3 2008, right? 4 A. Well, there were two: one in 5 1994 and another -- I'm sorry, 1992, and 6 another in 2008. 7 Q. Well, there are actually 8 several more than that, but let's just focus 9 on the 2008. 10 In 2008, a citizens petition 11 was submitted? 12 A. Yes, that is true. 13 Q. And PCPC responded to that 14 citizens petition in 2009, correct? 15 A. They submitted comments. Is 16 that what you're asking me? Yes, they did. 17 Q. Yes. 18 And that was a cover letter, 19 correct? 20 A. A cover letter -- that's all it 21 was was a cover letter? 22 Q. Well, attached to the cover 23 letter was a report from Drs. Huncharek and 24 Muscat? 25 A. Yes, that is true.</p>	<p>1 A. I would have to pull this 2 document, but in paragraph 90 I make a 3 statement: A 2005 response written by 4 Dr. Muscat says -- this is not '09, this is 5 2005, and Dr. Huncharek critiqued the work of 6 Dr. Cramer, who also failed to disclose the 7 financial relation -- I'll start over. 8 Okay. So I'm sorry to repeat 9 myself, but there was a little noise. 10 You asked 2009. So the other 11 time period I have in my report in 12 paragraph 90 talks about 2005, but I'd have 13 to pull this document. 14 But I am citing to the 15 deposition of Dr. Loretz, who was a PCPC 16 employee, so I think I would need to pull 17 this in order to confirm. 18 But I see depositions of her 19 and Dr. Nicholson as talking about them 20 failing to disclose the financial 21 relationship between their work and industry. 22 Q. So if Dr. Loretz did not 23 testify that PCPC had retained Drs. Huncharek 24 and Muscat in 2005, you'd have no other 25 evidence?</p>

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<p>1 A. I can't answer that</p> <p>2 definitively, but this is what I would point</p> <p>3 you to. So I'd have to pull these documents</p> <p>4 to confirm, but I have -- both paragraphs 89</p> <p>5 and 90 address these general issues for you,</p> <p>6 but I think that's the sentence and the</p> <p>7 documents that I think would be relevant.</p> <p>8 But I'd have to pull them to fully answer</p> <p>9 your question.</p> <p>10 Q. The reason I ask the question</p> <p>11 is because you frequently say "the cosmetics</p> <p>12 industry" without identifying a party or a</p> <p>13 person. And -- well, I'll just leave it at</p> <p>14 that.</p> <p>15 A. And I guess the reason I'm</p> <p>16 saying I need to -- I'm questioning that it</p> <p>17 doesn't have to do with PCPC is because I am</p> <p>18 citing to a deposition of their employee. So</p> <p>19 I need to -- I would -- to affirm it, though,</p> <p>20 I'd need to -- I don't want to say that</p> <p>21 100 percent the answer to your question is</p> <p>22 this is the evidence, but I believe that I</p> <p>23 would need to go here to confirm one way or</p> <p>24 the other. But certainly I would -- this</p> <p>25 raises suspicion about that for me.</p>	<p>1 Q. What evidence do you have of</p> <p>2 that?</p> <p>3 A. Based upon the close</p> <p>4 interaction between PCPC, Imerys and Johnson</p> <p>5 & Johnson throughout these time periods when</p> <p>6 different actions were being taken to comment</p> <p>7 or to submit information on behalf of</p> <p>8 industry.</p> <p>9 Q. Do you have a single document</p> <p>10 you can point to or is that an assumption?</p> <p>11 A. That is something I seem to</p> <p>12 remember based on my review of these</p> <p>13 documents, but if you need a document, I</p> <p>14 would have to -- have to go and look for it.</p> <p>15 Q. Sitting here today, you can't</p> <p>16 recall?</p> <p>17 A. I can't give you a specific</p> <p>18 document as I sit here today, no.</p> <p>19 MR. LOCKE: I have no further</p> <p>20 questions.</p> <p>21 MR. MEADOWS: Yeah, short</p> <p>22 break. Maybe we're done, maybe we're</p> <p>23 not.</p> <p>24 VIDEOGRAPHER: We are going off</p> <p>25 the record at 4:30 p.m.</p>
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<p>1 Q. You have no evidence that PCPC</p> <p>2 ever retained the Center for Regulatory</p> <p>3 Effectiveness; is that correct?</p> <p>4 A. I believe my evidence is hiring</p> <p>5 through Imerys, but let me look to make sure</p> <p>6 that is true.</p> <p>7 Q. Why don't you look at page --</p> <p>8 or I'm sorry, paragraph 95, page 63.</p> <p>9 A. That's where I am. That's</p> <p>10 where I am, so let me read what I have here</p> <p>11 because it's been a while since I've read</p> <p>12 this paragraph.</p> <p>13 So the question is, do I have</p> <p>14 in evidence this paragraph that PCPC directly</p> <p>15 hired the CRE?</p> <p>16 No, that is not provided by</p> <p>17 this paragraph.</p> <p>18 Q. Okay.</p> <p>19 A. However, in this paragraph,</p> <p>20 based on these documents that I'm seeing and</p> <p>21 I'm -- my memory of what is discussed,</p> <p>22 certainly I believe PCPC would have been</p> <p>23 aware of the interaction of CRE at these time</p> <p>24 points when I'm talking about this event --</p> <p>25 these events.</p>	<p>1 (Off the record at 4:30 p.m.)</p> <p>2 VIDEOGRAPHER: We are back on</p> <p>3 the record at 4:45 p.m.</p> <p>4 CROSS-EXAMINATION</p> <p>5 QUESTIONS BY MS. PARFITT:</p> <p>6 Q. All right. Dr. Plunkett, good</p> <p>7 afternoon. I know it's been a long day.</p> <p>8 Dr. Plunkett, you were asked</p> <p>9 throughout the course of the day about</p> <p>10 different constituents which are part of the</p> <p>11 talcum powder products.</p> <p>12 Do you recall those questions?</p> <p>13 A. Yes.</p> <p>14 Q. All right. If -- without going</p> <p>15 through each and every one of different</p> <p>16 constituents that we've talked about that are</p> <p>17 contained or could be contained in the talcum</p> <p>18 powder products, if they are present, do</p> <p>19 those various constituents present and</p> <p>20 provide biologically plausible evidence that</p> <p>21 talcum powder products can increase the risk</p> <p>22 of ovarian cancer?</p> <p>23 MS. BOCKUS: Object to the</p> <p>24 form.</p> <p>25 THE WITNESS: Yes, which is --</p>

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<p>1 I think I have a couple of paragraphs 2 where I talk about that issue. It has 3 to do -- there's other information as 4 well, but that is a key piece of that 5 information. And I focused on mode of 6 action and additivity. That's on 7 mechanism, biologic plausibility. 8 So the fact that you have a 9 variety of constituents that have a 10 known cancer hazard that share a mode 11 of action, that increases your 12 confidence in the biologic 13 plausibility of that relationship 14 between ovarian cancer and exposure to 15 talc body powders, yes. 16 MS. PARFITT: Thank you. I 17 have no further questions. Thank you 18 very much, Dr. Plunkett. And a happy 19 holiday to you. 20 THE WITNESS: Thank you. 21 MS. BRANSCOME: I have no 22 questions. 23 MS. BOCKUS: No questions. 24 VIDEOGRAPHER: The time now is 25 4:47 p.m. This concludes the</p>	<p>1 CERTIFICATE 2 3 I, CARRIE A. CAMPBELL, Registered 4 Diplomate Reporter, Certified Realtime Reporter and Certified Shorthand Reporter, do 5 hereby certify that prior to the commencement of the examination, Laura Plunkett, Ph.D., 6 DABT was duly sworn by me to testify to the truth, the whole truth and nothing but the 7 truth. 8 I DO FURTHER CERTIFY that the foregoing is a verbatim transcript of the 9 testimony as taken stenographically by and before me at the time, place and on the date hereinbefore set forth, to the best of my 10 ability. 11 I DO FURTHER CERTIFY that I am neither a relative nor employee nor attorney 12 nor counsel of any of the parties to this action, and that I am neither a relative nor 13 employee of such attorney or counsel, and that I am not financially interested in the 14 action. 15 16 17 18 CARRIE A. CAMPBELL, NCRA Registered Diplomate Reporter 19 Certified Realtime Reporter California Certified Shorthand Reporter #13921 20 Missouri Certified Court Reporter #859 Illinois Certified Shorthand Reporter 21 #084-004229 Texas Certified Shorthand Reporter #9328 22 Kansas Certified Court Reporter #1715 Notary Public 23 24 Dated: 12/20/18 25</p>
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<p>1 deposition, and we are going off the 2 record. 3 (Deposition concluded at 4:47 p.m.) 4 ----- 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25</p>	<p>1 INSTRUCTIONS TO WITNESS 2 3 Please read your deposition over 4 carefully and make any necessary corrections. 5 You should state the reason in the 6 appropriate space on the errata sheet for any 7 corrections that are made. 8 After doing so, please sign the 9 errata sheet and date it. You are signing 10 same subject to the changes you have noted on 11 the errata sheet, which will be attached to 12 your deposition. 13 It is imperative that you return 14 the original errata sheet to the deposing 15 attorney within thirty (30) days of receipt 16 of the deposition transcript by you. If you 17 fail to do so, the deposition transcript may 18 be deemed to be accurate and may be used in 19 court. 20 21 22 23 24 25</p>

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1	ACKNOWLEDGMENT OF DEPONENT	1	-----
2		2	LAWYER'S NOTES
3		3	-----
4	I, _____, do	4	PAGE LINE
5	hereby certify that I have read the foregoing	5	_____
6	pages and that the same is a correct	6	_____
7	transcription of the answers given by me to	7	_____
8	the questions therein propounded, except for	8	_____
9	the corrections or changes in form or	9	_____
10	substance, if any, noted in the attached	10	_____
11	Errata Sheet.	11	_____
12		12	_____
13	Laura Plunkett, Ph.D., DABT DATE _____	13	_____
14		14	_____
15	Subscribed and sworn to before me this	15	_____
16	_____ day of _____, 20 _____.	16	_____
17	My commission expires: _____	17	_____
18		18	_____
19	Notary Public	19	_____
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4:45 369:3	112:6 124:2			
4:47 370:25	208:9 318:16			
371:3	70 145:19 167:1			
40 64:3	338:17			
400 129:7	703 2:10			
43 65:15 66:10	70s 165:1			
68:1,17 183:12	740.1 46:21 47:3			
435-7000 2:15	47:25			
44 103:2 313:17	75 125:1 128:25			
46 313:14	77 316:12			
463-2400 3:9	78205 3:4			
47 280:19	<hr/>			
289:17,24	8			
4900 2:9	8 4:5,11 5:1			
<hr/>	208:9 211:14			
5	211:18,21			
5 4:13,18 14:8	219:16 236:4			
16:3,16,23	80s 165:2			
19:14 86:13	850 2:15			
124:25 206:16	859 372:20			
206:21	877.370.3377			
50 347:11	1:22			
351:16	89 318:8 366:4			
554-5500 3:4	<hr/>			
56 95:12,16	9			
571-4965 3:14	9 208:9			

Exhibit 28

**UNITED STATES DISTRICT COURT
DISTRICT OF NEW JERSEY**

**IN RE JOHNSON & JOHNSON
TALCUM POWDER PRODUCTS
MARKETING, SALES PRACTICES,
AND PRODUCTS LIABILITY
LITIGATION**

MDL NO. 16-2738 (FLW) (LHG)

THIS DOCUMENT RELATES TO ALL CASES

**RULE 26 EXPERT REPORT OF
DR. GHASSAN M. SAED**

Date: November 16, 2018

Dr. Ghassan M. Saed

Molecular basis for the association of talcum powder use with increased risk of ovarian cancer.

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Qualifications

In this report, I describe the role of oxidative stress in the pathogenesis and behavior of ovarian cancer, as well as describe the biological effects of talcum powder on normal ovarian and fallopian tube cells, macrophages, and ovarian cancer cells.

I am an Associate Professor with tenure at Wayne State University in Detroit, Michigan, where I am Director of Ovarian Cancer Research. I am a faculty member in the Departments of Obstetrics & Gynecology, Cell Biology, and Anatomy & Physiology at Wayne State School of Medicine. I am also a Member of the Karmanos Cancer Institute, Molecular Biology and Genetics Program.

I received a Ph.D. in Molecular Biology at the University of Essex, Colchester, England in 1986. My postgraduate training included a Fellowship in Immunopathology at the University of Michigan, Ann Arbor from 1992-1993 and a Fellowship in Molecular Biology at the Henry Ford Hospital in Detroit, Michigan from 1988-1990. I joined the faculty at Wayne State School of Medicine in 1998.

My laboratory investigates the role of oxidative stress in the pathogenesis of ovarian cancer. This concentration arose from my original research that focused on the molecular mechanisms involved in the pathogenesis of tissue fibrosis and the need to compare the effects of oxidative stress on a malignant overgrowth versus a benign overgrowth, specifically postoperative adhesions.

My research in ovarian cancer has resulted in the identification of biomarkers for assessing the progression and metastasis of ovarian cancer. The major outcome of my work with fibrosis and postoperative adhesions, in addition to the development of the ex-vivo model for adhesion, was the development and characterization of the adhesion phenotype in cell culture. Additionally,

the cell culture system was used to test the hypothesis that hypoxia is the trigger for the development of postoperative adhesions.

I have taught numerous undergraduate, graduate, medical students, residents, and fellows. Many of these have received research awards, published important papers, and accepted prestigious academic faculty positions. I have been the recipient of national and international grants and contracts from organizations including the American Association for Cancer Research (AACR), NIH/NICHD, U.S. Department of Defense, the Ovarian Cancer Research Fund Alliance, the Michigan Ovarian Cancer Alliance, and other ovarian cancer foundations. I have been a prolific publisher and presenter at scientific meetings. I have been an author on 136 original studies published in peer-reviewed journals with additional review articles, and book chapters. Recently, I published a review article in the journal, Gynecologic Oncology titled, “Updates of the role of oxidative stress in the pathogenesis of ovarian cancer” and a textbook chapter titled “New insights into the Pathogenesis of Ovarian Cancer: Oxidative Stress” summarizing my research in this area. My CV is attached as Exhibit A. In addition to the references included in this report, the materials I reviewed are attached as Exhibit B. My fees and prior testimony are attached as Exhibit C.

Ovarian cancer

Ovarian cancer is the most lethal gynecologic malignancy and ranks fifth in cancer deaths among women diagnosed with cancer¹. Epithelial ovarian cancer (EOC) has long been considered a heterogeneous disease with respect to histopathology, molecular biology, and clinical outcome^{1,2}. It comprises at least five distinct histological subtypes, the most common and well-studied being high-grade serous ovarian cancer. In the last decade, researchers have proposed the theory that many ovarian cancers arise from the distal fallopian tubes. For this reason, as well as the similarities in pathogenesis, presentation, treatment, and prognosis, fallopian tube, ovarian, and

peritoneal cancer are generally treated as a single entity. Although surgical techniques and treatments have advanced over the years, the prognosis of EOC remains poor, with a 5-year survival rate of 50% in advanced stage ². This is largely due to the lack of early warning symptoms and screening methods, and the development of chemoresistance ^{1,2}. Ovarian cancer is known to be associated with germline mutations in the BRCA1 or BRCA2 genes, but with a rate of only 20-40%, suggesting the presence of other unknown mutations in other predisposition genes ³. Additional genetic variations including single nucleotide polymorphisms (SNPs) have been described to act as low to moderate penetrant alleles that contribute to ovarian cancer risk ^{3,4}. Non-synonymous SNPs substitute encoded amino acids in proteins and are more likely to alter the structure, function, and interaction of the protein ⁴. The pathophysiology of EOC is not fully understood but has been strongly associated with inflammation and the resultant oxidative stress⁵.

Oxidative stress

Homeostasis, the balance between the production and elimination of oxidants, is maintained by mechanisms involving oxidants and antioxidant enzymes and molecules. If this balance is altered, it leads to an enhanced state of oxidative stress that alters key biomolecules and cells of living organism ⁵. Oxidant molecules are divided into two main groups; oxygen-derived or nitrogen-containing molecules. Oxygen-derived molecules, also known as reactive oxygen species (ROS), include free radicals such as hydroxyl (HO^\bullet), superoxide ($\text{O}_2^{\bullet-}$), peroxy (RO_2^\bullet), and alkoxy (RO^\bullet), as well as oxidizing agents such as hydrogen peroxide (H_2O_2), hypochlorous acid (HOCl), ozone (O_3), and singlet oxygen ($^1\text{O}_2$) that can be converted to radicals ^{5,6}. Nitrogen containing oxidants, also known as reactive nitrogen species (RNS), are derived from nitric oxide (NO) that is produced in the mitochondria in response to hypoxia ⁵. Exposure to inflammation, infection, carcinogens, and toxicants are major sources of ROS and RNS, *in vivo* ⁵⁻⁸. Additionally,

RNS and ROS can be produced by various enzymes including cytochrome P450, lipoxygenase, cyclooxygenase, nicotinamide adenine dinucleotide phosphate (NAD(P)H) oxidase complex, xanthine oxidase (XO), and peroxisomes (Figure 1) ^{5,7,9}.

To maintain the redox balance, ROS and RNS are neutralized by various important enzyme systems including superoxide dismutase (SOD), catalase (CAT), glutathione S-transferase (GST), glutathione (GSH), thioredoxin coupled with thioredoxin reductase, glutaredoxin, glutathione peroxidase (GPX), and glutathione reductase (GSR) ⁶. Superoxide dismutase is known to convert $O_2^{\bullet-}$ to H_2O_2 , which is then converted to water by CAT. Glutathione S-transferase is involved in detoxification of carcinogens and xenobiotics by catalyzing their conjugation to GSH that will aid in expulsion from the cell ⁶. Indeed, the GSH-to-oxidized-GSH (GSH/GSSG) ratio is a good indicator of cellular redox buffering capacity ^{10,11}. Under enhanced oxidative stress, the GSH/GSSG complex is known to stimulate the activity of the GS-X-MRP1 efflux pump, which removes toxins from cells. This mechanism has been investigated in the development of resistance to chemotherapeutic drugs ^{10,11}.

Ovarian Cancer Cells Manifest a Persistent Pro-Oxidant State

Recent evidence demonstrates that oxidative stress is a critical factor in the initiation and development of several cancers, including ovarian cancer ^{12,13}. Consistently, it has been reported that ovarian cancer patients manifest significantly decreased levels of antioxidants and higher levels of oxidants ¹²⁻¹⁷. An enhanced redox state, resulting from increased expression of key pro-oxidant enzymes and decreased expression of antioxidant enzymes, has been extensively described in epithelial ovarian cancer (EOC) ¹⁶⁻¹⁸. My laboratory has previously reported that MPO, a hemoprotein present solely in myeloid cells that acts as a powerful oxidant, and iNOS, a key pro-oxidant enzyme, are highly expressed and co-localized to the same cell in EOC cells ¹⁷. These two

enzymes, MPO and iNOS, work together to inhibit apoptosis, a hallmark of ovarian cancer cells. Apoptosis, or programmed cell death, refers to the normal and controlled death of cells. Myeloperoxidase acts as powerful oxidant enzyme in EOC cells through the utilization of nitric oxide (NO) produced by iNOS as a one-electron substrate generating NO^+ , a labile nitrosylating species^{19,21}. My laboratory was the first to report that MPO was expressed by EOC cells and tissues¹⁷. Silencing MPO gene expression utilizing MPO specific siRNA induced apoptosis in EOC cells through a mechanism that involved the S-nitrosylation of caspase-3 by MPO¹⁷. Additionally, there is compelling evidence that MPO serves as a source of free iron under oxidative stress, where both NO^+ and superoxide are elevated¹⁹. Iron reacts with hydrogen peroxide (H_2O_2) and catalyzes the generation of highly reactive hydroxy radical (HO^\bullet), thereby increasing oxidative stress, which in turn increases free iron concentrations by the Fenton and Haber–Weiss reaction^{19,21}. Additionally, my laboratory has highlighted the potential benefits of the combination of serum MPO and free iron as biomarkers for early detection and prognosis of ovarian cancer¹⁴. EOC cells are also characterized by enhanced expression of NAD(P)H oxidase, a potent oxidant enzyme that is known to be the major source of $\text{O}_2^{\bullet-}$ in the cell. Such high levels of $\text{O}_2^{\bullet-}$ combined with significantly high levels of NO generates peroxynitrite, another powerful nitrosylation and nitration agent, which modifies proteins and DNA structure and function in cells²².

A reliable screening and detection method based on molecular profiles for ovarian cancer has not yet been developed because the disease exhibits a wide range of morphological, clinical and genetic variations during its progression. The search for non-invasive, cost-effective ovarian cancer biomarker tests has been ongoing for many years. Immunizations of mice with ovarian cancer cells has led to hybridoma validation by ELISA, while flow cytometry analysis permitted the discovery of cancer antigen (CA)-125 (the only marker currently used in clinical practice) and

mesothelin²³. Furthermore, the screening of an array of 21,500 unknown ovarian cDNAs hybridized with labeled first-strand cDNA from ten ovarian tumors and six normal tissues led to the discovery of human epididymis protein 4 (HE4)²⁴. Most interestingly, HE4 is overexpressed in 93% of serous and 100% of endometrioid EOCs, and in 50% of clear cell carcinomas, but not in mucinous ovarian carcinomas²⁵. Thus, HE4 was identified as one of the most useful biomarkers for ovarian cancer, although it lacked tissue-specificity^{24,26-28}. Secreted HE4 high levels were also detected in the serum of ovarian cancer patients²⁹. Additionally, combining CA-125 and HE4 is a more accurate predictor of malignancy than either alone³⁰⁻³². The discovery of MPO expression in ovarian EOC cells and tissues was surprising, as it is only expressed by cells of myeloid origin. Intriguingly, my laboratory has previously reported that the combination of serum MPO and free iron may serve as biomarkers for early detection of ovarian cancer¹⁴.

Common Polymorphisms in Redox Enzymes are Associated with Ovarian Cancer.

A single nucleotide polymorphism (SNP) occurs as a result of gene point mutations with an estimated frequency of at least one in every 1000 base pairs that are selectively maintained and distributed in populations throughout the human genome³³. An association between common SNPs in oxidative DNA repair genes and redox genes with human cancer susceptibility has been established⁷. Common SNPs in the redox enzymes are known to be strongly associated with an altered enzymatic activity in these enzymes, and helps explain the enhanced redox state that has been linked to several malignancies, including ovarian cancer^{12,16}. Additionally, it helps explain the observation of significantly decreased apoptosis and increased survival of EOC cells¹⁷. It is therefore critical to determine the exact effect of common SNPs in various redox enzymes on all process involved in the development of the oncogenic phenotype³⁴⁻³⁷. Such studies can be linked to other studies focusing on determining the effects of genes involved in carcinogen metabolism

(detoxification and/or activation), redox enzymes, and DNA repair pathways³⁶. Numerous SNPs associated with change of function have been identified in antioxidant enzymes including *CAT*, *GPX1*, *GSR*, and *SOD2*^{35,37}. Additionally, the association between genetic polymorphisms in genes with anti-tumor activity and those involved in the cell cycle has been reported in ovarian cancer^{38,39}. Recently, several genetic variations have been identified in genome-wide association studies (GWAS), and were found to act as low to moderate penetrant alleles, which contribute to ovarian cancer risk, as well as other diseases^{4,40}.

There is now an association of specific SNPs in key oxidant and anti-oxidant enzymes that impact increased risk of ovarian cancer and/or overall survival of patients with ovarian cancer^{34,35}. A common SNP that reduced CAT activity (rs1001179) was utilized as a significant predictor of death when present in ovarian cancer patients and was also associated with increased risk for breast cancer^{34,35,37,41}. This SNP is also linked to increased risk, survival, and response to adjuvant treatment of cancer patients, including ovarian^{34,42}. Another common SNP that reduced CYBA activity (rs4673) was also reported to be associated with an increased risk for ovarian cancer^{34,35}. The mutant genotype of the *CYBA* gene has been shown to both decrease and increase activity of the protein, thereby altering the generation of $O_2^{\bullet-}$ ^{34,35}. Moreover, functionally distinct *MPO* polymorphisms, such as (rs2333227) have been linked to relative increased risk for development of ovarian cancer as well as other cancers^{34,35,43}. Additional SNPs that influenced the risk of EOC have been successfully identified from the GWAS studies including rs3814113 (located at 9p22, near *BNC2*), rs2072590 (located at 2q31, which contains a family of *HOX* genes), rs2665390 (located at 3q25, intronic to *TIPARP*), rs10088218 (located at 8q24, 700 kb downstream of *MYC*), rs8170 (located at 19p13, near *MERIT40*), and rs9303542 (located at 17q21, intronic to *SKAP1*)

^{34,35}. Thus, the genetic component of increased ovarian cancer risk may be attributed to SNPs that result in point mutations in the redox genes and potentially other genes ⁴⁴.

Chemoresistance is Associated with Point Mutations in Key Redox Enzymes in EOC cells

To date, the acquisition of chemoresistance in ovarian cancer is being investigated. The enhanced oxidant state reported in chemoresistant EOC cells is likely linked to point mutations in key redox enzymes ³⁵. Chemoresistant EOC cells manifested increased levels of CAT, GPX, and iNOS and decreased levels of GSR, SOD, and NAD(P)H oxidase as compared to their sensitive counterparts ³⁵. Interestingly, chemoresistant EOC cells, and not their sensitive counterparts, manifested specific point mutations that corresponded to known functional SNPs, in key redox enzymes including *SOD2* (rs4880), *NOS2* (rs2297518), and *CYBA* (rs4673) ⁴⁵. However, altered enzymatic activity for CAT and GSR observed in chemoresistant EOC cells did not correspond to the specific SNP of interest in those enzymes, indicating involvement of other possible functional SNPs for those enzymes ³⁵. Coincidentally, chemotherapy treatment induced point mutations that happen to correspond to known functional SNPs in key oxidant enzymes subsequently led to the acquisition of chemoresistance by EOC cells. Indeed, the induction of specific point mutations in *SOD2* or *GPX1* in sensitive EOC cells resulted in a decrease in the sensitivity to chemotherapy of these cells ³⁵. In fact, the addition of *SOD* to sensitive EOC cells during chemotherapy treatment synergistically increased the efficacy to chemotherapy ³⁵.

Alternatively, the observed nucleotide switch in response to chemotherapy in EOC cells may be the result of nucleotide substitution, a process that includes transitions, replacement of one purine by the other or that of one pyrimidine by the other, or transversions, replacement of a purine by a pyrimidine or vice versa ³⁵. Actually, hydroxyl radicals are known to react with DNA causing the formation of many pyrimidine and purine-derived lesions ³⁵. The oxidative damage to 8-Oxo-

2'-deoxyguanosine, a major product of DNA oxidation, induces genetic alterations in oncogenes and tumor suppressor genes that have been involved in tumor initiation and progression³⁵. A GC to TA transversion has been reported in the *ras* oncogene and the *p53* tumor suppressor gene in several cancers. However, the GC to TA transversion is not unique to hydroxy-2'-deoxyguanosine, as CC to TT substitutions have been identified as signature mutations for oxidants and free radicals³⁵. Moreover, the observed nucleotide switch in response to chemotherapy in EOC cells can be due to the fact that acquisition of chemoresistance generates an entirely different population of cells with a distinct genotype. Hence, chemotherapy kills the bulk of the tumor cells leaving a subtype of cancer cells with ability for repair and renewal, known as cancer stem cells (CSCs)³⁵. Indeed, cancer stem cells have been isolated from various types of cancer including leukemia, breast, brain, pancreatic, prostate, ovary and colon³⁵. Interestingly, CSC populations were present in cultures of SKOV-3 EOC cells and have been shown to be chemoresistant in nature³⁵.

Talcum powder and increased risk of ovarian cancer

Talcum powder is made from talc, a mineral containing mainly of the elements magnesium, silicon, and oxygen. In its natural form, some talc contains asbestos. Talc and asbestos are both silicate minerals; the carcinogenic effects of asbestos have been extensively studied and documented in the medical literature^{46,47}. Asbestos fibers in the lung initiate an inflammatory and scarring process, and it has been proposed that ground talc, as a foreign body, initiates a similar inflammatory response and it has been proposed that ground talc, as a foreign body, might initiate an inflammatory response^{48,47}. There has been concern about a possible link between talcum powder usage in the genital and ovarian cancer, as well as lung cancer in workers exposed to talc in an occupational setting⁴⁹. Studies that exposed lab animals (rats, mice, and hamsters) to asbestos-free talcum powder in various ways have had mixed results, with some showing tumor

formation and others finding only inflammation^{50,51}. The International Agency for Research on Cancer (IARC) is part of the World Health Organization (WHO). Its major goal is to identify causes of cancer. Based on limited evidence from human studies of a link to ovarian cancer, IARC classified the perineal (genital) use of talc-based body powder (not containing asbestiform fibers) as “possibly carcinogenic to humans.” (Group 2b)⁸⁸. Talcum powder containing asbestos and fibrous talc are both considered carcinogenic (Group 1) by IARC⁸⁹.

The association between perineal talc powder dusting and ovarian cancer has been studied in at least 25 case-control studies, three cohort studies, six meta-analyses and one pooled study⁷³. Although the cohort studies individually did not show a statistically significant increased risk of ovarian cancer with talcum powder usage, the case-control studies overall and the meta-analyses show a consistent and significant increased risk. This risk is estimated to be 30-40%. The studies have shown conflicting results regarding the presence of a dose-response, largely due to the failure of many studies to obtain necessary information on the frequency and duration of usage and the inherent challenge of quantifying actual exposure. Although migration/transport of particles through the genital tract is universally accepted and the inflammatory nature of talcum powder consistently demonstrated, the exact mechanism for carcinogenesis had not been conclusively elucidated. For these reasons, there has been some reluctance in the scientific community to accept talcum powder as a causative risk factor for the development of ovarian cancer. The most recent meta-analysis, reported by Penninkilampi and Eslick in 2017, found that any perineal talc use was associated with a statistically significant increased risk of ovarian cancer (OR = 1.31). More than 3600 lifetime applications (OR = 1.42) were slightly more associated with ovarian cancer than <3600 (OR = 1.32). An association with ever use of talc was found in case-control studies (OR = 1.35), but not cohort studies (OR = 1.06). However, cohort studies found an association between

talc use and invasive serous type ovarian cancer (OR = 1.25), the most common and most lethal subtype. In the opinion of the authors, meta-analysis is the highest level of evidence in this setting because of the need for a large number of cases and long-term follow-up in a relatively rare form of cancer with a lengthy latency period. The authors of this meta-analysis suggested that cellular injury, oxidative stress, and local increase in inflammatory mediators might be the mechanism by which talcum powder promotes carcinogenesis, but that this mechanism was unclear. They recognized the “substantial need for further research on a potential mechanism by which ovarian cancer may be caused by talc, as this will allow a causal relationship to be established or rejected with more certainty”⁷³.

In addition to epidemiological studies, the claim that regular use of talcum powder for perineal hygiene purpose is associated with an increased risk of ovarian cancer is based on several reports confirming the presence of talc particles in the ovaries and other parts of the female reproductive tract as well as in lymphatic vessels and tissues of the pelvis^{45,75}. Henderson first reported the presence of talc particles in ovaries in 1971. A study by Cramer, et al has reported the presence of talc in pelvic lymph nodes of a woman with ovarian cancer who used talc daily for 30 years⁴⁵. The ability of talc particles to migrate through the genital tract to the distal fallopian tube and ovaries is well accepted^{45,75}.

It has been suggested that the associations between perineal talc dusting and ovarian cancer might be explained by the induction of ANTI-MUC1 antibodies⁵⁷. Additionally, in a previous study by Shukla et.al., whereby human mesothelial cells (LP9/TERT-1) were exposed to low and high (15 and 75 mm²/cm² dish) equal surface area concentrations of nonfibrous talc for 8 or 24 hours, the authors found that nonfibrous talc at low concentrations to cause an increase in the

expression of Activating Transcription Factor 3 (ATF3) at 8 hours and no changes at 24 hours, whereas expression levels of 30 genes were elevated at 8 hours at high talc concentrations⁷⁸.

My laboratory undertook research to determine whether or not there was a molecular basis for the observed association between talcum powder and ovarian cancer. If a biological effect was demonstrated, we hoped to define the mechanism in detail. Issues like this one, relating to the pathogenesis of ovarian cancer and the relationship between inflammation and other pathological conditions in the female reproductive system as well as cancer, have been the focus of my laboratory for many years.

Findings from recent research from our laboratory relating to the effects of talcum powder exposure *in vitro*

The following is a description of the methodology used:

Cell Lines: Ovarian cancer cells: SKOV-3 (ATCC), A2780 (Sigma Aldrich), and TOV112D (a kind gift from Gen Sheng Wu at Wayne State University, Detroit, MI)²⁵. Normal cell lines: human macrophage cells (EL-1, ATCC), human primary normal ovarian epithelial cells (Cell Biologics), Human Ovarian Epithelial Cells (HOSEpiC, ScienCell Research Laboratories, Inc.) immortalized human fallopian tube secretory epithelial cells (FT33-shp53-R24C, Applied Biological Materials). All cells were grown in media and conditions following manufacturer's protocol. EL-1 cells were grown in IMDM media (ATCC) supplemented with 0.1 mM hypoxanthine and 0.1 mM thymidine solution (H-T, ATCC) and 0.05mM β -mercaptoethanol. SKOV-3 EOC cells were grown in HyClone McCoy's 5A medium (Fisher Scientific), A2780 EOC cells were grown in HyClone RPMI-1640 (Fisher Scientific), and both TOV112D EOC cells were grown in MCDB105 (Cell Applications) and Medium 199 (Fisher Scientific) (1:1). All media was supplemented with fetal bovine serum (FBS, Innovative Research) and penicillin/streptomycin

(Fisher Scientific), per their manufacturer specifications. Human primary normal ovarian epithelial cells were grown in Complete Human Epithelial Cell Medium (Cell Biologics).

Treatment of cells: Talcum powder (Fisher Scientific, Catalog #T4-500, Lot#166820) or Johnson's Baby Powder (Johnson & Johnson, #30027477, Lot#13717RA) was dissolved in DMSO (Sigma Aldrich) at a concentration of 500 mg in 10 ml and was filtered with a 0.2 μ m syringe filter (Corning). Sterile DMSO was used as a control for all treatments. Cells were seeded in 100 mm cell culture dishes (3×10^6) and were treated 24 hours later with 0, 5, 20, or 100 μ g/ml of talc for 48 hours. Cell pellets were collected for RNA, DNA, and protein extraction. Cell culture media was collected for CA-125 analysis by ELISA.

Real time RT-PCR: Total RNA was extracted from all cells using the RNeasy Mini Kit (Qiagen) according to the protocol provided by the manufacturer. Measurement of the amount of RNA in each sample was performed using a Nanodrop Spectrophotometer (Thermo Fisher Scientific). A 20 μ L cDNA reaction volume containing 0.5 μ g RNA was prepared using the SuperScript VILO Master Mix Kit (Life Technologies), as described by the manufacturer's protocol. Optimal oligonucleotide primer pairs were selected for each target using Beacon Designer (Premier Biosoft, Inc., Table 1). Quantitative RT-PCR was performed using the EXPRESS SYBR Green ER qPCR Supermix Kit (Life Technologies) and the Cepheid 1.2f Detection System as previously described²⁴. Standards with known concentrations and lengths were designed specifically for β -actin (79 bp), CAT (105 bp), iNOS (89 bp), GSR (103 bp), GPX1 (100 bp), MPO (79 bp), and SOD3 (84 bp), allowing for construction of a standard curve using a 10-fold dilution series²⁶. A specific standard for each gene allows for absolute quantification of the gene in number of copies, which can then be expressed per microgram of RNA. All samples

were normalized to the housekeeping gene, β -actin. A final melting curve analysis was performed to demonstrate specificity of the PCR product.

Protein Detection: Cell pellets were lysed utilizing cell lysis buffer (20 mM Tris-HCl (pH 7.5), 150 mM NaCl, 1 mM Na₂EDTA, 1 mM EGTA, 1% Triton, 2.5 sodium pyrophosphate, 1 mM beta-glycerophosphate, 1 mM Na₃VO₄, 1 μ g/ml leupeptin) containing a cocktail of protease inhibitors. Samples were centrifuged at 13000 rpm for 10 minutes at 4°C. Total protein concentration of cell lysates from control and talc-treated cells was measured with the Pierce BCA Protein Assay Kit (Thermo Scientific, Rockford, Illinois) per the manufacturer's protocol.

Detection of protein/activity by ELISA: ELISA kits for each target were purchased and used according to the manufacturer's protocol. The following ELISA kits were purchased from Cayman Chemical, Ann Arbor, MI: CAT, SOD3, GSR, GPX1, and MPO. Nitrite (NO₂⁻)/nitrate (NO₃⁻) were determined spectrophotometrically by measuring their absorbance at 210 nm after separation by HPLC with standard NO₂⁻/NO₃⁻ as previously reported¹⁹. The analysis was performed by a HPLC system (Shimadzu Scientific Instruments, Inc.) including a LC-10ADV pump, fr-10A injector and DGU-14A degasser. Nitrite/nitrate were detected using an RF-10 XL fluorescence detector with 210 nm excitation and 440 nm emission. CA-125 protein levels were measured in cell media by ELISA from Ray Biotech according to the manufacturer's protocol.

TaqMan® SNP Genotyping Assay: DNA was isolated utilizing the EZ1 DNA Tissue Kit (Qiagen Valencia, CA) for EOC cells according the manufacturer's protocols. The TaqMan® SNP Genotyping Assay Set (Applied Biosystems, Carlsbad, CA) (NCBI dbSNP genome build 37, MAF source 1000 genomes) were used to genotype the SNPs described in Table 1. The Applied Genomics Technology Center (AGTC, Wayne State University, Detroit, MI) performed these

assays. Analysis was done utilizing the QuantStudio™ 12 K Flex Real-Time PCR System (Applied Biosystems).

Statistical Analysis: Normality was examined using the Kolmogorov-Smirnov test and by visual inspection of quantile-quantile plots. Because most of the data were not normally distributed, differences in distributions were examined using the Kruskal-Wallis test. Generalized linear models were fit to examine pairwise differences in estimated least squares mean expression values by exposure to 0, 5, 20 or 100 ug/ml of Talc. We used the Tukey-Kramer adjustment for multiple comparisons, and the regression models were fit using log₂ transformed analyte expression values after adding a numeric constant '1' to meet model assumptions while avoiding negative transformed values. P-values below 0.05 are statistically significant.

Research Findings: Recent studies from our laboratory have shown conclusively that talcum powder alter key redox and inflammatory markers, enhance cell proliferation, and inhibit apoptosis in EOC cells, which are hallmarks of ovarian cancer. More importantly, this effect is also manifested by talcum powder in normal cells, including surface ovarian epithelium, fallopian tube, and macrophages. Oxidative stress has been implicated in the pathogenesis of ovarian cancer, specifically, by increased expression of several key pro-oxidant enzymes such as iNOS, MPO, and NAD(P)H oxidase in EOC tissues and cells as compared to normal cells indicating an enhanced redox state, as we have recently demonstrated ¹⁹. This redox state is further enhanced in chemoresistant EOC cells as evident by a further increase in iNOS and NO₂⁻/NO₃⁻ and a decrease in GSR levels, suggesting a shift towards a pro-oxidant state ¹⁹. Antioxidant enzymes, key regulators of cellular redox balance, are differentially expressed in various cancers, including ovarian ^{19,79}. Specifically, GPX expression is reduced in prostate, bladder, and estrogen receptor negative breast cancer cell lines as well as in cancerous tissues from the kidney. However, GPX

activity is increased in cancerous tissues from breast⁷⁹. Glutathione reductase levels, on the other hand, are elevated in lung cancer, although differentially expressed in breast and kidney cancerous tissues^{5,80}. Similarly, CAT was decreased in breast, bladder, and lung cancer while increased in brain cancer⁸¹⁻⁸³. Superoxide dismutase is expressed in lung, colorectal, gastric ovarian, and breast cancer, while decreased activity and expression have been reported in colorectal carcinomas and pancreatic cancer cells⁸³⁻⁸⁶. Collectively, this differential expression of antioxidants demonstrates the unique and complex redox microenvironment in cancer. Glutathione reductase is a flavoprotein that catalyzes the NADPH-dependent reduction of oxidized glutathione (GSSG) to GSH. This enzyme is essential for the GSH redox cycle which maintains adequate levels of reduced cellular GSH. A high GSH/GSSG ratio is essential for protection against oxidative stress. Treatment with talc significantly reduced GSR in normal and cancer cells, altering the redox balance. Likewise, GPX is an enzyme that detoxifies reactive electrophilic intermediates and thus plays an important role in protecting cells from cytotoxic and carcinogenic agents. Overexpression of GPX is triggered by exogenous chemical agents and reactive oxygen species, and is thus thought to represent an adaptive response to stress⁸⁰. Treatment of normal and cancer cells with talc significantly reduced GPX, which compromised the overall cell response to stress.

We have previously reported that EOC cells manifest increased cell proliferations and decreased apoptosis¹⁹. Consistent with these findings, recent studies from my laboratory have shown that talc enhances cell proliferation and induces an inhibition in apoptosis in EOC cells, but more importantly in normal cells, suggesting talc is a stimulus to the development of the oncogenic phenotype. We also previously reported a cross-talk between iNOS and MPO in ovarian cancer which contributed to the lower apoptosis observed in ovarian cancer cells^{17,19}. Collectively, we now have substantial evidence demonstrating that altered oxidative stress may play a role in

maintaining the oncogenic phenotype of EOC cells. Treatment of normal or ovarian cancer cells with talc resulted in a significant increase in MPO and iNOS, supporting the role of talc in the enhancement of a pro-oxidant state that is a major cause in the development and maintenance of the oncogenic phenotype.

Furthermore, CA-125, which exists as a membrane-bound and secreted protein in epithelial ovarian cancer cells, has been established as a biomarker for disease progression and response to treatment². CA-125 expression was significantly increased from nearly undetectable levels in controls to values approaching clinical significance (35 U/ml in postmenopausal women⁸⁷) in talc treated cell lines without the physiologic effects on the tumor microenvironment one would expect to be present in the human body, highlighting the implications of the pro-oxidant states caused by talc alone.

To elucidate the mechanism by which talc alters the redox balance to favor a pro-oxidant state not only in ovarian cancer cells, but more importantly in normal cells, my laboratory examined selected known gene mutations in key oxidant and antioxidant enzymes. These mutations correspond to specific SNPs that are known to be associated with altered enzymatic activity and increased cancer risk^{34,35}. Results show that the *CAT* SNP (rs769217) which results in decreased enzymatic activity was induced in all normal cell lines tested and in TOV112D EOC lines. However, the *CAT* mutation was not detected in A2780 or SKOV-3 cell lines. Nevertheless, our results confirm a decrease in *CAT* expression and enzymatic activity in all talc treated cells, indicating the existence of other *CAT* SNPs. However, the *SOD3* (rs2536512) and *GSR* (rs8190955) SNP genotypes were not detected in any cell line, yet *SOD3* and *GSR* activity and expression were decreased in all talc treated cells, again suggesting the presence of other SNPs. Our results have also shown that all cells, except for HOSEpiC cells, manifest the SNP genotype

of *GPXI* (C/T) before talc treatment. Intriguingly, talc treatment reversed this SNP genotype to the normal genotype. Consistent with this finding, it has previously been reported that acquisition of chemoresistance by ovarian cancer cells is associated with a switch from the *GPXI* SNP genotype to the normal *GPXI* genotype³⁵. It is not understood why a *GPXI* SNP genotype predominates in untreated normal and ovarian cancer cells. Additionally, our results showed that talc treatment was associated with a genotype switch from common C/C genotype in *NOS2* in untreated cells to T/T, the SNP genotype, in talc treated cells, except in A2780 and TOV112D. Nevertheless, our results confirm an increase in iNOS expression and enzymatic activity in all talc treated cells, again suggesting the existence of other *NOS2* SNPs. Collectively, these findings demonstrate that talc treatment induced gene point mutations that happen to correspond to SNPs in locations with functional effects, thus altering overall redox balance for the initiation and development of ovarian cancer. Future studies examining such SNPs are important to fully elucidate a genotype switch mechanism induced by talc exposure.

In summary, this research clearly demonstrates that talcum powder induces inflammation and alters the redox balance favoring a pro-oxidant state in normal and EOC cells. This study has shown a dose-dependent significant increase in key pro-oxidants, iNOS, NO₂⁻/NO₃⁻, and MPO and a concomitant decrease in key antioxidant enzymes, CAT, SOD, GPX, and GSR, in all talc treated cells (both normal and ovarian cancer) compared to their controls. Additionally, there was a significant increase in CA-125 levels in all the talc treated cells compared to their controls, except in macrophages (which do not produce CA-125). The mechanism by which talc alters the cellular redox and inflammatory balance involves the induction of specific mutations in key oxidant and antioxidant enzymes that correlate with alterations in their activities. The fact that these mutations

happen to correspond to known SNPs of these enzymes indicate a genetic predisposition to developing ovarian cancer with genital talcum powder exposure.

Summary of opinions

These opinions are made to a reasonable degree of scientific certainty and are based on my experience, training, and expertise, as well as a knowledge of the relevant scientific literature and my previous and ongoing research.

1. Johnson's Baby Powder elicits an inflammatory response in normal ovarian and tubal cells and in ovarian cancer cells that can result in the development and the progression of ovarian cancer.
2. This pro-carcinogenic process involves oxidative stress, alteration of the redox environment by increasing oxidant enzymes and decreasing anti-oxidant enzymes, promotion of cell proliferation, inhibition of apoptosis, and induction of specific genetic mutations.
3. Johnson's Baby Powder exposure results in elevation of CA-125, a clinically relevant biomarker for ovarian cancer, in normal and ovarian cancer cells.
4. The molecular effects resulting from Johnson's Baby Powder exposure exhibit a clear dose-response pattern.
5. In my opinion, based on established molecular mechanisms for the pathogenesis of ovarian cancer (as evidenced in the peer-reviewed scientific literature and my previously published research) and my *in vitro* experiments, Johnson's Baby Powder exposure can cause ovarian cancer.
6. In my opinion, based on established molecular mechanisms that influence the progression and chemoresistance associated with ovarian cancer (as evidenced in the peer-reviewed

scientific literature and my previously published research) and my *in vitro* experiments,

Johnson's Baby Powder exposure worsens the prognosis for patients with ovarian cancer.

I reserve the right to amend or supplement this report as new information becomes available.

References

1. Berek, J.S., *et al.* [Epithelial ovarian cancer (advanced stage): consensus conference (1998)]. *Gynecol Obstet Fertil* **28**, 576-583 (2000).
2. Jelovac, D. & Armstrong, D.K. Recent progress in the diagnosis and treatment of ovarian cancer. *CA Cancer J Clin* **61**, 183-203 (2011).
3. Prat, J., Ribe, A. & Gallardo, A. Hereditary ovarian cancer. *Hum Pathol* **36**, 861-870 (2005).
4. Ramus, S.J., *et al.* Consortium analysis of 7 candidate SNPs for ovarian cancer. *Int J Cancer* **123**, 380-388 (2008).
5. Reuter, S., Gupta, S.C., Chaturvedi, M.M. & Aggarwal, B.B. Oxidative stress, inflammation, and cancer: how are they linked? *Free Radic Biol Med* **49**, 1603-1616 (2010).
6. Lei, X.G., *et al.* Paradoxical Roles of Antioxidant Enzymes: Basic Mechanisms and Health Implications. *Physiol Rev* **96**, 307-364 (2016).
7. Klaunig, J.E., Kamendulis, L.M. & Hocevar, B.A. Oxidative stress and oxidative damage in carcinogenesis. *Toxicologic pathology* **38**, 96-109 (2010).
8. Coussens, L.M. & Werb, Z. Inflammation and cancer. *Nature* **420**, 860-867 (2002).
9. Fruehauf, J.P. & Meyskens, F.L., Jr. Reactive oxygen species: a breath of life or death? *Clin Cancer Res* **13**, 789-794 (2007).
10. Circu, M.L. & Aw, T.Y. Glutathione and modulation of cell apoptosis. *Biochimica et biophysica acta* **1823**, 1767-1777 (2012).
11. Ishikawa, T. & Ali-Osman, F. Glutathione-associated cis-diamminedichloroplatinum(II) metabolism and ATP-dependent efflux from leukemia cells. Molecular characterization of

- glutathione-platinum complex and its biological significance. *J Biol Chem* **268**, 20116-20125 (1993).
12. Saed, G.M., Fletcher, N.M., Jiang, Z.L., Abu-Soud, H.M. & Diamond, M.P. Dichloroacetate induces apoptosis of epithelial ovarian cancer cells through a mechanism involving modulation of oxidative stress. *Reproductive sciences* **18**, 1253-1261 (2011).
 13. Senthil, K., Aranganathan, S. & Nalini, N. Evidence of oxidative stress in the circulation of ovarian cancer patients. *Clin Chim Acta* **339**, 27-32 (2004).
 14. Fletcher, N.M., *et al.* Myeloperoxidase and free iron levels: potential biomarkers for early detection and prognosis of ovarian cancer. *Cancer Biomark* **10**, 267-275 (2011).
 15. Hileman, E.O., Liu, J., Albitar, M., Keating, M.J. & Huang, P. Intrinsic oxidative stress in cancer cells: a biochemical basis for therapeutic selectivity. *Cancer Chemother Pharmacol* **53**, 209-219 (2004).
 16. Jiang, Z., *et al.* Modulation of redox signaling promotes apoptosis in epithelial ovarian cancer cells. *Gynecologic oncology* **122**, 418-423 (2011).
 17. Saed, G.M., *et al.* Myeloperoxidase serves as a redox switch that regulates apoptosis in epithelial ovarian cancer. *Gynecologic oncology* **116**, 276-281 (2010).
 18. Malone, J.M., Saed, G.M., Diamond, M.P., Sokol, R.J. & Munkarah, A.R. The effects of the inhibition of inducible nitric oxide synthase on angiogenesis of epithelial ovarian cancer. *Am J Obstet Gynecol* **194**, 1110-1116; discussion 1116-1118 (2006).
 19. Saed, G.M., Diamond, M.P. & Fletcher, N.M. Updates of the role of oxidative stress in the pathogenesis of ovarian cancer. *Gynecologic oncology* (2017).
 20. Galijasevic, S., Saed, G.M., Hazen, S.L. & Abu-Soud, H.M. Myeloperoxidase metabolizes thiocyanate in a reaction driven by nitric oxide. *Biochemistry* **45**, 1255-1262 (2006).

21. Galijasevic, S., *et al.* Myeloperoxidase interaction with peroxynitrite: chloride deficiency and heme depletion. *Free Radic Biol Med* **47**, 431-439 (2009).
22. Habib, S. & Ali, A. Biochemistry of nitric oxide. *Indian J Clin Biochem* **26**, 3-17 (2011).
23. Sasaroli, D., Coukos, G. & Scholler, N. Beyond CA125: the coming of age of ovarian cancer biomarkers. Are we there yet? *Biomark Med* **3**, 275-288 (2009).
24. Schummer, M., *et al.* Comparative hybridization of an array of 21,500 ovarian cDNAs for the discovery of genes overexpressed in ovarian carcinomas. *Gene* **238**, 375-385 (1999).
25. Drapkin, R., *et al.* Human epididymis protein 4 (HE4) is a secreted glycoprotein that is overexpressed by serous and endometrioid ovarian carcinomas. *Cancer Res* **65**, 2162-2169 (2005).
26. Galgano, M.T., Hampton, G.M. & Frierson, H.F., Jr. Comprehensive analysis of HE4 expression in normal and malignant human tissues. *Mod Pathol* **19**, 847-853 (2006).
27. Gilks, C.B., Vanderhyden, B.C., Zhu, S., van de Rijn, M. & Longacre, T.A. Distinction between serous tumors of low malignant potential and serous carcinomas based on global mRNA expression profiling. *Gynecologic oncology* **96**, 684-694 (2005).
28. Hough, C.D., *et al.* Large-scale serial analysis of gene expression reveals genes differentially expressed in ovarian cancer. *Cancer Res* **60**, 6281-6287 (2000).
29. Bouchard, D., Morisset, D., Bourbonnais, Y. & Tremblay, G.M. Proteins with whey-acidic-protein motifs and cancer. *Lancet Oncol* **7**, 167-174 (2006).
30. Rosen, D.G., *et al.* Potential markers that complement expression of CA125 in epithelial ovarian cancer. *Gynecologic oncology* **99**, 267-277 (2005).
31. Scholler, N., *et al.* Bead-based ELISA for validation of ovarian cancer early detection markers. *Clin Cancer Res* **12**, 2117-2124 (2006).

32. Moore, R.G., *et al.* The use of multiple novel tumor biomarkers for the detection of ovarian carcinoma in patients with a pelvic mass. *Gynecologic oncology* **108**, 402-408 (2008).
33. Erichsen, H.C. & Chanock, S.J. SNPs in cancer research and treatment. *Br J Cancer* **90**, 747-751 (2004).
34. Belotte, J., *et al.* A Single Nucleotide Polymorphism in Catalase Is Strongly Associated with Ovarian Cancer Survival. *PloS one* **10**, e0135739 (2015).
35. Fletcher, N.M., *et al.* Specific point mutations in key redox enzymes are associated with chemoresistance in epithelial ovarian cancer. *Free Radic Biol Med* **102**, 122-132 (2016).
36. Klaunig, J.E., Wang, Z., Pu, X. & Zhou, S. Oxidative stress and oxidative damage in chemical carcinogenesis. *Toxicol Appl Pharmacol* **254**, 86-99 (2011).
37. Forsberg, L., Lyrenas, L., de Faire, U. & Morgenstern, R. A common functional C-T substitution polymorphism in the promoter region of the human catalase gene influences transcription factor binding, reporter gene transcription and is correlated to blood catalase levels. *Free Radic Biol Med* **30**, 500-505 (2001).
38. Goode, E.L., *et al.* Candidate gene analysis using imputed genotypes: cell cycle single-nucleotide polymorphisms and ovarian cancer risk. *Cancer epidemiology, biomarkers & prevention : a publication of the American Association for Cancer Research, cosponsored by the American Society of Preventive Oncology* **18**, 935-944 (2009).
39. Notaridou, M., *et al.* Common alleles in candidate susceptibility genes associated with risk and development of epithelial ovarian cancer. *Int J Cancer* **128**, 2063-2074 (2011).
40. Savas, S., Schmidt, S., Jarjanazi, H. & Ozcelik, H. Functional nsSNPs from carcinogenesis-related genes expressed in breast tissue: potential breast cancer risk alleles and their distribution across human populations. *Hum Genomics* **2**, 287-296 (2006).

41. Quick, S.K., *et al.* Effect modification by catalase genotype suggests a role for oxidative stress in the association of hormone replacement therapy with postmenopausal breast cancer risk. *Cancer epidemiology, biomarkers & prevention : a publication of the American Association for Cancer Research, cosponsored by the American Society of Preventive Oncology* **17**, 1082-1087 (2008).
42. Didziapetriene, J., Bublevic, J., Smailyte, G., Kazbariene, B. & Stukas, R. Significance of blood serum catalase activity and malondialdehyde level for survival prognosis of ovarian cancer patients. *Medicina* **50**, 204-208 (2014).
43. Castillo-Tong, D.C., *et al.* Association of myeloperoxidase with ovarian cancer. *Tumour biology : the journal of the International Society for Oncodevelopmental Biology and Medicine* **35**, 141-148 (2014).
44. Sellers, T.A., *et al.* Association of single nucleotide polymorphisms in glycosylation genes with risk of epithelial ovarian cancer. *Cancer epidemiology, biomarkers & prevention : a publication of the American Association for Cancer Research, cosponsored by the American Society of Preventive Oncology* **17**, 397-404 (2008).
45. Saed, G.M., Diamond, M.P. & Fletcher, N.M. Updates of the role of oxidative stress in the pathogenesis of ovarian cancer. *Gynecologic oncology* **145**, 595-602 (2017).
46. Haegens, A., *et al.* Asbestos-induced lung inflammation and epithelial cell proliferation are altered in myeloperoxidase-null mice. *Cancer Res* **65**, 9670-9677 (2005).
47. Muscat, J.E. & Huncharek, M.S. Perineal talc use and ovarian cancer: a critical review. *Eur J Cancer Prev* **17**, 139-146 (2008).
48. Ness, R.B. & Cottreau, C. Possible role of ovarian epithelial inflammation in ovarian cancer. *J Natl Cancer Inst* **91**, 1459-1467 (1999).

49. Karageorgi, S., Gates, M.A., Hankinson, S.E. & De Vivo, I. Perineal use of talcum powder and endometrial cancer risk. *Cancer epidemiology, biomarkers & prevention : a publication of the American Association for Cancer Research, cosponsored by the American Society of Preventive Oncology* **19**, 1269-1275 (2010).
50. Graham, J. & Graham, R. Ovarian cancer and asbestos. *Environ Res* **1**, 115-128 (1967).
51. Langseth, H. & Kjærheim, K. Ovarian cancer and occupational exposure among pulp and paper employees in Norway. *Scandinavian Journal of Work, Environment & Health* **30**, 356-361 (2004).
52. Booth, M., Beral, V. & Smith, P. Risk factors for ovarian cancer: a case-control study. *Br J Cancer* **60**, 592-598 (1989).
53. Chang, S. & Risch, H.A. Perineal talc exposure and risk of ovarian carcinoma. *Cancer* **79**, 2396-2401 (1997).
54. Chen, Y., *et al.* Risk factors for epithelial ovarian cancer in Beijing, China. *Int J Epidemiol* **21**, 23-29 (1992).
55. Cook, L.S., Kamb, M.L. & Weiss, N.S. Perineal powder exposure and the risk of ovarian cancer. *American journal of epidemiology* **145**, 459-465 (1997).
56. Cramer, D.W., *et al.* Genital talc exposure and risk of ovarian cancer. *Int J Cancer* **81**, 351-356 (1999).
57. Cramer, D.W., *et al.* Conditions associated with antibodies against the tumor-associated antigen MUC1 and their relationship to risk for ovarian cancer. *Cancer epidemiology, biomarkers & prevention : a publication of the American Association for Cancer Research, cosponsored by the American Society of Preventive Oncology* **14**, 1125-1131 (2005).

58. Cramer, D.W., Welch, W.R., Scully, R.E. & Wojciechowski, C.A. Ovarian cancer and talc: a case-control study. *Cancer* **50**, 372-376 (1982).
59. Endo-Capron, S., Renier, A., Janson, X., Kheuang, L. & Jaurand, M.C. In vitro response of rat pleural mesothelial cells to talc samples in genotoxicity assays (sister chromatid exchanges and DNA repair). *Toxicol In Vitro* **7**, 7-14 (1993).
60. Ferrer, J., Villarino, M.A., Tura, J.M., Traveria, A. & Light, R.W. Talc preparations used for pleurodesis vary markedly from one preparation to another. *Chest* **119**, 1901-1905 (2001).
61. Gertig, D.M., *et al.* Prospective study of talc use and ovarian cancer. *J Natl Cancer Inst* **92**, 249-252 (2000).
62. Harlow, B.L. & Weiss, N.S. A case-control study of borderline ovarian tumors: the influence of perineal exposure to talc. *American journal of epidemiology* **130**, 390-394 (1989).
63. Mills, P.K., Riordan, D.G., Cress, R.D. & Young, H.A. Perineal talc exposure and epithelial ovarian cancer risk in the Central Valley of California. *Int J Cancer* **112**, 458-464 (2004).
64. Ness, R.B., *et al.* Factors related to inflammation of the ovarian epithelium and risk of ovarian cancer. *Epidemiology* **11**, 111-117 (2000).
65. Purdie, D., *et al.* Reproductive and other factors and risk of epithelial ovarian cancer: an Australian case-control study. Survey of Women's Health Study Group. *Int J Cancer* **62**, 678-684 (1995).
66. Rosenblatt, K.A., Mathews, W.A., Daling, J.R., Voigt, L.F. & Malone, K. Characteristics of women who use perineal powders. *Obstet Gynecol* **92**, 753-756 (1998).

67. Tzonou, A., *et al.* Hair dyes, analgesics, tranquilizers and perineal talc application as risk factors for ovarian cancer. *Int J Cancer* **55**, 408-410 (1993).
68. Whittemore, A.S., *et al.* Personal and environmental characteristics related to epithelial ovarian cancer. II. Exposures to talcum powder, tobacco, alcohol, and coffee. *American journal of epidemiology* **128**, 1228-1240 (1988).
69. Wong, C., Hempling, R.E., Piver, M.S., Natarajan, N. & Mettlin, C.J. Perineal talc exposure and subsequent epithelial ovarian cancer: a case-control study. *Obstet Gynecol* **93**, 372-376 (1999).
70. Harlow, B.L., Cramer, D.W., Bell, D.A. & Welch, W.R. Perineal exposure to talc and ovarian cancer risk. *Obstet Gynecol* **80**, 19-26 (1992).
71. Hankinson, S.E., *et al.* Tubal ligation, hysterectomy, and risk of ovarian cancer. A prospective study. *JAMA* **270**, 2813-2818 (1993).
72. Terry, K.L., *et al.* Genital powder use and risk of ovarian cancer: a pooled analysis of 8,525 cases and 9,859 controls. *Cancer Prev Res (Phila)* **6**, 811-821 (2013).
73. Penninkilampi, R. & Eslick, G.D. Perineal Talc Use and Ovarian Cancer: A Systematic Review and Meta-Analysis. *Epidemiology* **29**, 41-49 (2018).
74. Reid, B.M., Permuth, J.B. & Sellers, T.A. Epidemiology of ovarian cancer: a review. *Cancer Biol Med* **14**, 9-32 (2017).
75. Kunz, G., *et al.* The uterine peristaltic pump. Normal and impeded sperm transport within the female genital tract. *Adv Exp Med Biol* **424**, 267-277 (1997).
76. Leyendecker, G., *et al.* Uterine peristaltic activity and the development of endometriosis. *Ann N Y Acad Sci* **1034**, 338-355 (2004).

77. Zervomanolakis, I., *et al.* Physiology of upward transport in the human female genital tract. *Ann N Y Acad Sci* **1101**, 1-20 (2007).
78. Shukla, A., *et al.* Alterations in gene expression in human mesothelial cells correlate with mineral pathogenicity. *Am J Respir Cell Mol Biol* **41**, 114-123 (2009).
79. Brigelius-Flohe, R. & Kipp, A. Glutathione peroxidases in different stages of carcinogenesis. *Biochimica et biophysica acta* **1790**, 1555-1568 (2009).
80. Sun, Y. Free radicals, antioxidant enzymes, and carcinogenesis. *Free Radic Biol Med* **8**, 583-599 (1990).
81. Popov, B., Gadjeva, V., Valkanov, P., Popova, S. & Tolekova, A. Lipid peroxidation, superoxide dismutase and catalase activities in brain tumor tissues. *Arch Physiol Biochem* **111**, 455-459 (2003).
82. Ray, G., *et al.* Lipid peroxidation, free radical production and antioxidant status in breast cancer. *Breast Cancer Res Treat* **59**, 163-170 (2000).
83. Chung-man Ho, J., Zheng, S., Comhair, S.A., Farver, C. & Erzurum, S.C. Differential expression of manganese superoxide dismutase and catalase in lung cancer. *Cancer Res* **61**, 8578-8585 (2001).
84. Radenkovic, S., *et al.* Lactate dehydrogenase, catalase, and superoxide dismutase in tumor tissue of breast cancer patients in respect to mammographic findings. *Cell Biochem Biophys* **66**, 287-295 (2013).
85. Hu, Y., *et al.* Mitochondrial manganese-superoxide dismutase expression in ovarian cancer: role in cell proliferation and response to oxidative stress. *J Biol Chem* **280**, 39485-39492 (2005).

86. Svensk, A.M., Soini, Y., Paakko, P., Hiravikoski, P. & Kinnula, V.L. Differential expression of superoxide dismutases in lung cancer. *Am J Clin Pathol* **122**, 395-404 (2004).
87. Scholler, N. & Urban, N. CA125 in ovarian cancer. *Biomark Med* **1**, 513-523 (2007).
88. IARC Working Group on the Evaluation of Carcinogenic Risks to Humans. "IARC Monographs on the Evaluation of Carcinogenic Risks to Humans Volume 93 Carbon Black, Titanium Dioxide, and Talc." IARC Monographs on the Evaluation of Carcinogenic Risks to Humans / World Health Organization, International Agency for Research on Cancer 93 (2010): 1–413.
89. IARC. "IARC Monographs on the Evaluation of Carcinogenic Risks to Humans: Volume 100C," 2012.

Exhibit 29

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Page 1

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF NEW JERSEY

IN RE: JOHNSON & JOHNSON TALCUM

POWDER PRODUCTS MARKETING, SALES

PRACTICES, AND PRODUCTS

LIABILITY LITIGATION

MDL NO: 16-2738 (FLW) (LHG)

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THIS DOCUMENT RELATES TO

ALL CASES

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PAGE 1 TO 343

The Videotaped Deposition of GHASSAN SAED, PH.D.,
Taken at 1 Park Avenue,
Detroit, Michigan,
Commencing at 9:15 a.m.,
Wednesday, January 23, 2019,
Before Laurel A. Frogner, RMR, CRR, CSR-2495.

Ghassan Saed, Ph.D.

Page 2	Page 4
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<p style="text-align: right;">Page 6</p> <p>1 APPEARANCES (Continued):</p> <p>2</p> <p>3 COUGHLIN DUFFY LLP</p> <p>4 BY: JONATHAN F. DONATH, ESQ.</p> <p>5 350 Mount Kemble Avenue</p> <p>6 P.O. Box 1917</p> <p>7 Morristown, New Jersey 07962</p> <p>8 973-267-0058</p> <p>9 jdonath@coughlinduffy.com</p> <p>10 Appearing on behalf of the Defendant Imerys Talc America</p> <p>11</p> <p>12</p> <p>13 TUCKER ELLIS</p> <p>14 BY: JAMES W. MIZGALA, ESQ.</p> <p>15 233 South Wacker Drive</p> <p>16 Chicago, Illinois 60606</p> <p>17 312-624-6300</p> <p>18 James.mizgala@tuckerellis.com</p> <p>19 Appearing on behalf of the Defendant PTI</p> <p>20</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p>	<p style="text-align: right;">Page 8</p> <p>1 TABLE OF CONTENTS</p> <p>2 Witness Page</p> <p>3 EXAMINATION BY MR. HEGARTY 17</p> <p>4 EXAMINATION BY MR. KLATT 283</p> <p>5 RE-EXAMINATION BY MR. HEGARTY 316</p> <p>6 EXAMINATION BY MS. O'DELL 319</p> <p>7 RE-EXAMINATION BY MR. HEGARTY 328</p> <p>8 RE-EXAMINATION BY MR. KLATT 337</p> <p>9 EXAMINATION BY MR. LOCKE 339</p> <p>10</p> <p>11</p> <p>12 INDEX TO EXHIBITS</p> <p>13 (Exhibits attached to transcript)</p> <p>14</p> <p>15 Exhibit Page</p> <p>16 SAED DEPOSITION EXHIBIT NUMBER 1, COPY OF NOTEBOOK 13</p> <p>17 BATES SAED000001 - SAED000097, WAS MARKED BY THE</p> <p>18 REPORTER FOR IDENTIFICATION</p> <p>19</p> <p>20 SAED DEPOSITION EXHIBIT NUMBER 2, LAB NOTEBOOK, 13</p> <p>21 (Retained by Witness) WAS MARKED BY THE REPORTER</p> <p>22 FOR IDENTIFICATION</p> <p>23</p> <p>24</p> <p>25</p>
<p style="text-align: right;">Page 7</p> <p>1 APPEARANCES (Continued):</p> <p>2</p> <p>3 SEYFARTH SHAW LLP</p> <p>4 BY: THOMAS T. LOCKE, ESQ.</p> <p>5 975 F Street, N.W.</p> <p>6 Washington, D.C. 20004</p> <p>7 202-463-2400</p> <p>8 tlocke@seyfarth.com</p> <p>9 Appearing on behalf of the Defendant PCPC</p> <p>10</p> <p>11 ALSO PRESENT: Marc Myers, Videographer</p> <p>12</p> <p>13</p> <p>14</p> <p>15</p> <p>16</p> <p>17 * * * * *</p> <p>18</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p>	<p style="text-align: right;">Page 9</p> <p>1 SAED DEPOSITION EXHIBIT NUMBER 3, LAB NOTEBOOK, 14</p> <p>2 (Retained by Witness) WAS MARKED BY THE REPORTER</p> <p>3 FOR IDENTIFICATION</p> <p>4</p> <p>5 SAED DEPOSITION EXHIBIT NUMBER 4, INVOICES, WAS 22</p> <p>6 MARKED BY THE REPORTER FOR IDENTIFICATION</p> <p>7</p> <p>8 SAED DEPOSITION EXHIBIT NUMBER 5, DECEMBER 18, 35</p> <p>9 2018 DOCUMENT, WAS MARKED BY THE REPORTER FOR</p> <p>10 IDENTIFICATION</p> <p>11</p> <p>12 SAED DEPOSITION EXHIBIT NUMBER 6, COPY OF CHECK 40</p> <p>13 DATED 11/2/2017 FOR \$15,000, WAS MARKED BY THE</p> <p>14 REPORTER FOR IDENTIFICATION</p> <p>15</p> <p>16 SAED DEPOSITION EXHIBIT NUMBER 7, MOLECULAR BASIS 42</p> <p>17 SUPPORTING THE ASSOCIATION OF TALCUM POWDER USE</p> <p>18 WITH INCREASED RISK OF OVARIAN CANCER, WAS MARKED</p> <p>19 BY THE REPORTER FOR IDENTIFICATION</p> <p>20</p> <p>21 SAED DEPOSITION EXHIBIT NUMBER 8, MOLECULAR BASIS 45</p> <p>22 SUPPORTING THE ASSOCIATION OF TALCUM POWDER USE</p> <p>23 WITH INCREASED RISK OF OVARIAN CANCER, WAS MARKED</p> <p>24 BY THE REPORTER FOR IDENTIFICATION</p> <p>25</p>

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<p style="text-align: right;">Page 10</p> <p>1 SAED DEPOSITION EXHIBIT NUMBER 10, INDEX FOR LAB 78</p> <p>2 NOTEBOOK, WAS MARKED BY THE REPORTER FOR</p> <p>3 IDENTIFICATION</p> <p>4</p> <p>5 SAED DEPOSITION EXHIBIT NUMBER 9, PILOT STUDY, 84</p> <p>6 WAS MARKED BY THE REPORTER FOR IDENTIFICATION</p> <p>7</p> <p>8 SAED DEPOSITION EXHIBIT NUMBER 11, NOTEBOOKS, 132</p> <p>9 WAS MARKED BY THE REPORTER FOR IDENTIFICATION</p> <p>10</p> <p>11 SAED DEPOSITION EXHIBIT NUMBER 12, 151</p> <p>12 SAGE PUBLISHING DOCUMENT,</p> <p>13 WAS MARKED BY THE REPORTER FOR IDENTIFICATION</p> <p>14</p> <p>15 SAED DEPOSITION EXHIBIT NUMBER 13, 157</p> <p>16 SAGE PUBLISHING DOCUMENT,</p> <p>17 WAS MARKED BY THE REPORTER FOR IDENTIFICATION</p> <p>18</p> <p>19 SAED DEPOSITION EXHIBIT NUMBER 14, 161</p> <p>20 COPY OF LETTER FROM REPRODUCTIVE SCIENCES,</p> <p>21 WAS MARKED BY THE REPORTER FOR IDENTIFICATION</p> <p>22</p> <p>23 SAED DEPOSITION EXHIBIT NUMBER 15, JANUARY 14, 173</p> <p>24 2019 E-MAIL, WAS MARKED BY THE REPORTER FOR</p> <p>25 IDENTIFICATION</p>	<p style="text-align: right;">Page 12</p> <p>1 Detroit, Michigan</p> <p>2 Wednesday, January 23, 2019</p> <p>3 About 9:15 a.m.</p> <p>4 THE VIDEOGRAPHER: We are now on the record.</p> <p>5 My name is Marc Myers. I'm the videographer for Golkow</p> <p>6 Litigation Services. Today's date is January 23rd,</p> <p>7 2019. The time is now 9:15 a.m. This video deposition</p> <p>8 is being held in Detroit, Michigan in regards to the</p> <p>9 Johnson & Johnson Talcum Powder Products Marketing,</p> <p>10 Sales Practices, and Products Liability Litigation,</p> <p>11 pending in the United States District Court for the</p> <p>12 District of New Jersey.</p> <p>13 The deponent is Dr. Ghassan Saed. And</p> <p>14 counsel will be noted on the stenographic record. And</p> <p>15 will the court reporter please swear in the witness.</p> <p>16 DR. GHASSAN SAED,</p> <p>17 having first been duly sworn, was examined and</p> <p>18 testified on his oath as follows:</p> <p>19 MR. HEGARTY: Before we begin with</p> <p>20 questioning Dr. Saed, I want to make a note on the</p> <p>21 record with regard to materials that were produced to</p> <p>22 us this morning by counsel for Plaintiffs. Those</p> <p>23 materials included the original lab notebook for</p> <p>24 presumably the study that Dr. Saed did that's reported</p> <p>25 in a manuscript that we were provided as well in</p>
<p style="text-align: right;">Page 11</p> <p>1 SAED DEPOSITION EXHIBIT NUMBER 16, EXPERT REPORT, 175</p> <p>2 WAS MARKED BY THE REPORTER FOR IDENTIFICATION</p> <p>3</p> <p>4 SAED DEPOSITION EXHIBIT NUMBER 17, RESEARCH 214</p> <p>5 ARTICLE, WAS MARKED BY THE REPORTER FOR</p> <p>6 IDENTIFICATION</p> <p>7</p> <p>8 SAED DEPOSITION EXHIBIT NUMBER 18, CURRICULUM 278</p> <p>9 VITAE, WAS MARKED BY THE REPORTER FOR</p> <p>10 IDENTIFICATION</p> <p>11</p> <p>12 SAED DEPOSITION EXHIBIT NUMBER 19, ABSTRACT 315</p> <p>13 SUBMITTED TO SGO, WAS MARKED BY THE REPORTER FOR</p> <p>14 IDENTIFICATION</p> <p>15</p> <p>16 SAED DEPOSITION EXHIBIT NUMBER 20, ABSTRACT, 316</p> <p>17 WAS MARKED BY THE REPORTER FOR IDENTIFICATION</p> <p>18</p> <p>19 SAED DEPOSITION EXHIBIT NUMBER 21, ABSTRACT 317</p> <p>20 FROM SRI, WAS MARKED BY THE REPORTER FOR</p> <p>21 IDENTIFICATION</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p>	<p style="text-align: right;">Page 13</p> <p>1 advance, and it's our understanding that we were to</p> <p>2 have copies of the notebook provided to us in advance</p> <p>3 of the deposition. We were provided with what we</p> <p>4 believe to be that notebook that I'm marking as Exhibit</p> <p>5 Number 1.</p> <p>6 SAED DEPOSITION EXHIBIT NUMBER 1,</p> <p>7 COPY OF NOTEBOOK BATES SAED000001 - SAED000097,</p> <p>8 WAS MARKED BY THE REPORTER</p> <p>9 FOR IDENTIFICATION</p> <p>10 MR. HEGARTY: That notebook -- those notebook</p> <p>11 pages begin on Page 30 and go through Page 124 as noted</p> <p>12 in handwriting on the pages. They are Bates Numbered 1</p> <p>13 through 97.</p> <p>14 SAED DEPOSITION EXHIBIT NUMBER 2,</p> <p>15 LAB NOTEBOOK, (Retained by Witness)</p> <p>16 WAS MARKED BY THE REPORTER</p> <p>17 FOR IDENTIFICATION</p> <p>18 MR. HEGARTY: The lab notebook we've been</p> <p>19 provided this morning, which I will designate for</p> <p>20 purposes of the record as Exhibit Number 2, because we</p> <p>21 were told that we were not to mark on it and that Dr.</p> <p>22 Saed would retain it, but the lab notebook provided is</p> <p>23 Exhibit Number 2, includes Pages 1 through 29 which we</p> <p>24 were not provided in advance of the deposition. We</p> <p>25 believe those pages should have been provided along</p>

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<p style="text-align: right;">Page 14</p> <p>1 with the other pages pursuant to Judge Pisano's order 2 and pursuant to our Notice of Deposition. Not having 3 those pages in advance prejudices our right to have a 4 full and complete opportunity to discuss the lab 5 notebook with Dr. Saed during his deposition, and we 6 object to its production here this morning and 7 certainly reserve our right to seek additional time 8 with Dr. Saed as well as any other remedies that we 9 might be entitled to for what we believe to be an 10 untimely production. 11 Also, I will note for purposes of the record 12 that we received this morning as well another lab 13 notebook that is purported to be a notebook covering an 14 additional set of tests that Dr. Saed did with Fisher 15 Scientific Talc, and make note that there's a reference 16 in the manuscript that we were provided testing done on 17 Fisher Scientific talc. We'll designate for purposes 18 of the record this notebook is Exhibit Number 3. 19 SAED DEPOSITION EXHIBIT NUMBER 3, 20 LAB NOTEBOOK, (Retained by Witness) 21 WAS MARKED BY THE REPORTER 22 FOR IDENTIFICATION 23 MR. HEGARTY: This notebook was not provided 24 nor -- in advance of the deposition nor were any pages 25 of this notebook provided in advance of the deposition.</p>	<p style="text-align: right;">Page 16</p> <p>1 excuse me, was not a part of Dr. Saed's manuscript. 2 MR. HEGARTY: I marked it as Exhibit 3, the 3 other lab notebook. 4 MS. O'DELL: I'm referring to Exhibit 2, the 5 initial lab -- 6 MR. HEGARTY: Okay, I'm sorry, I thought you 7 were referring to the second one. 8 MS. O'DELL: I was not. 9 MR. HEGARTY: I'm sorry to interrupt. 10 MS. O'DELL: I'm pretty sure you are not 11 sorry you interrupted me, but Exhibit 2 is the lab 12 notebook I'm referring to, and the study that is the 13 basis of the objection was not a part of the manuscript 14 or the report. 15 Secondly, Exhibit 3 includes a separate and 16 distinct set of data for a Fisher talc study, and we 17 have provided that today, it was published in an 18 abstract and we provided that today in compliance with 19 the second notice of deposition. So the plaintiff's 20 position is we have provided everything the Judge 21 ordered, everything that's required as part of the 22 notice, and we'll oppose any motion to extend the 23 deposition and keep it open. 24 MR. HEGARTY: I do have a question. You're 25 saying that the lab notebook we designated as Exhibit</p>
<p style="text-align: right;">Page 15</p> <p>1 We have not had an opportunity to review it to know 2 whether this is pertinent to the manuscript that we'll 3 talk about here today, but also believe that this is 4 likely to also fall within the scope of Judge Pisano's 5 order and certainly within the scope of the Notice of 6 Deposition that we had made. So we also object to 7 its -- the timeliness of the production of this 8 notebook and, again, we reserve all rights for whatever 9 remedies are appropriate due to this late production. 10 MR. KLATT: Imerys Talc America joins in what 11 Mr. Hegarty said. And can we have the agreement we've 12 had that one objection is good for all? 13 MS. O'DELL: Yes. 14 MR. KLATT: All defendants join. 15 MS. O'DELL: So on behalf of the steering 16 committee, let me state that Judge Pisano's order 17 related to the specific -- a specific Notice of 18 Deposition that requested documents regarding the 19 underlying data and study that was reported in Dr. 20 Saed's manuscript as well as his expert report. That 21 was the subject of the order. Those materials were 22 provided in compliance with Judge Pisano's order. 23 There was a second general notice that asked for other 24 talc studies. The additional talc study that's noted 25 in the lab book Exhibit 2 was not a part of Judge --</p>	<p style="text-align: right;">Page 17</p> <p>1 Number 2 for which you provided copies is not related 2 to the manuscript that's titled Molecular Basis 3 Supporting the Association of Talcum Powder Use With 4 Increased Risk of Ovarian Cancer? 5 MS. O'DELL: That's not what I said. What I 6 said is the portion of the lab notebook Exhibit 2, 7 which you referred to as Pages 1 through 29, are not 8 reported in the manuscript or the report, the expert 9 report in this matter, and, therefore, they were not 10 subject Judge Pisano's previous ruling, so that's the 11 distinction that I'm making. These are materials that 12 were made available to you today and you have full 13 opportunity TO ask Dr. Saed questions about it. 14 MR. HEGARTY: I understand. 15 EXAMINATION BY MR. HEGARTY: 16 Q. Good morning, Dr. Saed. 17 A. Good morning. 18 Q. Would you -- strike that. My name is Mark Hegarty. I 19 represent the Johnson & Johnson defendants in this 20 matter. Would you please state your full name for the 21 record, please. 22 A. Ghassan Saed. 23 Q. Who is your current employer, Dr. Saed? 24 A. Wayne State University Medical School. 25 Q. What is your title?</p>

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<p style="text-align: right;">Page 18</p> <p>1 A. Wayne State University Medical School. 2 Q. What is your title there? 3 A. Associate professor. 4 Q. How long have you held that position? 5 A. Eight years about, I'm not -- 6 Q. Do you also have a separate personal consulting 7 business for purposes of litigation? 8 A. DS Biotech, it's a consulting company. 9 Q. Are there any other employees or owners or other 10 individuals involved in DS Biotech besides you? 11 A. No. 12 Q. Is your son in any way involved in that business? 13 A. Just doing some paperwork. 14 Q. Do you do any business through DS Biotech besides 15 expert witness consulting for litigation? 16 A. We do consulting for scientific testing for 17 universities, for investigators, we design experiments, 18 we help them write manuscripts. 19 Q. You said for other investigators or universities. Do 20 you do any business with any companies? 21 A. I do, yes. 22 Q. Can you name a company with whom you do business? 23 A. Temple Pharmaceuticals. 24 Q. How long has DS Biotech been in business? 25 A. 2006.</p>	<p style="text-align: right;">Page 20</p> <p>1 BY MR. HEGARTY: 2 Q. What portion of the fees have you not been paid -- 3 A. So we -- 4 Q. -- through DS Biotech? 5 A. So we have to deduct expenses and everything. 6 Q. Can you approximate the expenses you have had to deduct 7 from the fees you've -- 8 A. I haven't done it for this year yet. 9 Q. Do you have any other sources of income besides your 10 work at Wayne State and through DS Biotech? 11 A. No. 12 Q. What are you charging Plaintiff's Counsel in this 13 litigation for your work? 14 A. \$600 an hour. 15 Q. Do you have different rates for deposition or trial 16 testimony? 17 A. Do I have different rate? 18 Q. Sure. The rate you just quoted me was per hour, \$600 19 per hour. Do you have a different per-hour rate if 20 you're being deposed or if you're going to trial? 21 A. Oh, no. 22 Q. You have obligations at Wayne State University to 23 disclose financial arrangements -- 24 A. Yes. 25 Q. -- is that correct? Have you disclosed your financial</p>
<p style="text-align: right;">Page 19</p> <p>1 Q. Are you currently named as an expert witness in any 2 other litigation besides this one? 3 A. No. 4 Q. Have the fees that you have generated in connection 5 with your work on this case been directed to DS 6 Biotech? 7 A. Been directed? 8 Q. Well, have the fees that you have generated for your 9 work on this case been paid to DS Biotech? 10 A. Yes. 11 Q. Do you receive all of the income from those fees? 12 A. Through DS Biotech? 13 Q. Yes. 14 A. Yes, after I submit taxes and all that. 15 Q. But you essentially receive the fees even though they 16 were directed to DS Biotech, correct? 17 A. Correct, the company received it, yes. 18 Q. Then you have been -- you were paid by the company, 19 correct? 20 A. Yes. 21 Q. Were you -- have you been paid by the company the same 22 amount to which the fees generated? 23 MS. O'DELL: Object to the form. 24 THE WITNESS: Yeah, I am -- the answer is no. 25</p>	<p style="text-align: right;">Page 21</p> <p>1 arrangement -- 2 A. Yes. 3 Q. -- to Wayne State with regard to your work with 4 Plaintiff's Counsel in this case? 5 A. Yes. 6 Q. When did you make that disclosure? 7 A. Every year they -- there's a deadline to receive -- to 8 submit a form which shows consultation efforts, and for 9 2018 that was submitted 10 days ago. 10 Q. Who did you identify to whom you were consulting with 11 with regard to that disclosure for purposes of this 12 litigation? 13 A. DS Biotech and Beasley Allen. 14 Q. You prepared a report in this case, correct? 15 A. (Nods head.) 16 Q. Yes? 17 A. Did I prepare a report? Yes. 18 Q. Did anyone outside of the lawyers for the plaintiffs in 19 this case assist you in any way with that report? 20 A. No. 21 Q. Do you know how much you have been paid through the 22 present date for your work in this litigation? 23 A. Yes. 24 Q. How much? 25 A. Approximately 260, something like that.</p>

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<p>1 Q. 260,000?</p> <p>2 A. Yes, about that, maybe a little bit less, I don't know,</p> <p>3 I can't remember the exact number.</p> <p>4 SAED DEPOSITION EXHIBIT NUMBER 4,</p> <p>5 INVOICES,</p> <p>6 WAS MARKED BY THE REPORTER</p> <p>7 FOR IDENTIFICATION</p> <p>8 BY MR. HEGARTY:</p> <p>9 Q. I'm marking as Exhibit Number 4, Dr. Saed, copies of</p> <p>10 invoices that we were provided in advance of the</p> <p>11 deposition. Would you look at Exhibit Number 4, and</p> <p>12 tell me whether those are copies of all the invoices</p> <p>13 you have generated for purposes of your work in this</p> <p>14 case?</p> <p>15 A. Yeah, they look fine to me.</p> <p>16 Q. The last invoice we were provided is dated November 16,</p> <p>17 2018, that's the issue date. Have you prepared any</p> <p>18 additional invoices since that date?</p> <p>19 A. No.</p> <p>20 Q. Have you spent additional time on this case for which</p> <p>21 you intend to prepare an invoice --</p> <p>22 A. Yes.</p> <p>23 Q. -- since that date?</p> <p>24 A. Yes.</p> <p>25 Q. How much additional time have you spent that you have</p>	<p>1 Beasley Allen?</p> <p>2 A. So I started October, maybe 1st of October, maybe</p> <p>3 before that, I can't remember the exact date.</p> <p>4 Q. What is your best estimate?</p> <p>5 A. I would say end of September.</p> <p>6 Q. So the first invoice -- I'm sorry, go ahead.</p> <p>7 A. Go ahead.</p> <p>8 Q. So the first invoice on Exhibit Number 4 would reflect</p> <p>9 the time you spent from approximately the end of</p> <p>10 September through October 30th, 2017, correct?</p> <p>11 A. Correct.</p> <p>12 Q. Can you describe for me with regard to the first</p> <p>13 invoice the type of work that you did between the</p> <p>14 first -- between the end of September and the date of</p> <p>15 this first invoice?</p> <p>16 A. Sure. So this was time for meetings, meeting with them</p> <p>17 and reviewing literature basically.</p> <p>18 Q. You said meeting with them. Who is "them"?</p> <p>19 A. With Beasley Allen.</p> <p>20 Q. Which attorneys from Beasley Allen did you meet with?</p> <p>21 A. Dr. Thompson, Mrs. --</p> <p>22 MS. O'DELL: O'Dell.</p> <p>23 THE WITNESS: -- O'Dell and Jennifer --</p> <p>24 what's her last name?</p> <p>25</p>
Page 23	Page 25
<p>1 not yet invoiced?</p> <p>2 A. Approximately 100, 110 hours.</p> <p>3 Q. The invoices show that they were issued by DS Biotech,</p> <p>4 that's the company we talked about earlier, is that</p> <p>5 correct?</p> <p>6 A. Yes.</p> <p>7 Q. There are no other employees of DS Biotech besides</p> <p>8 yourself, is that correct?</p> <p>9 A. And help from my son, paperwork part-time.</p> <p>10 Q. Is he a paid employee?</p> <p>11 A. No.</p> <p>12 Q. The first page of Exhibit Number 4 with an issue date</p> <p>13 of the invoice 10-30-2017 includes just a single word</p> <p>14 in the description Consulting with no corresponding</p> <p>15 date. What is the date of the first consulting entry</p> <p>16 that you have listed on the first page of Exhibit</p> <p>17 Number 4?</p> <p>18 A. 10-30, so what's the -- I'm sorry.</p> <p>19 Q. Let me ask, Exhibit Number 4, the first page refers to</p> <p>20 an invoice of \$20,400 at a unit price of \$600, so there</p> <p>21 would be several hours, you spent several hours doing</p> <p>22 something that generated that invoice, correct?</p> <p>23 A. Yes.</p> <p>24 Q. When did that something start? When is the first time</p> <p>25 that you spent anytime on this matter on behalf of</p>	<p>1 BY MR. HEGARTY:</p> <p>2 Q. Do you recall the date of your first contact by Beasley</p> <p>3 Allen?</p> <p>4 A. Around middle of August.</p> <p>5 Q. How was that contact made?</p> <p>6 A. A phone call.</p> <p>7 Q. A phone call to you?</p> <p>8 A. Yes.</p> <p>9 Q. Who called you?</p> <p>10 A. Dr. Thompson.</p> <p>11 Q. Did you know Dr. Thompson before the call?</p> <p>12 A. No.</p> <p>13 Q. Apart from -- or strike that. What did she tell you</p> <p>14 when she first called you?</p> <p>15 A. She told me that they would like to meet with me to</p> <p>16 discuss the possibility of acting as a witness expert</p> <p>17 in ovarian cancer inflammation and oxidative stress.</p> <p>18 Q. Did you agree to serve as a retained expert on behalf</p> <p>19 of Beasley Allen at that first call?</p> <p>20 A. No.</p> <p>21 Q. What else were you told by Miss Thompson during that</p> <p>22 phone call?</p> <p>23 A. We just basically talked about setting a meeting and we</p> <p>24 did.</p> <p>25 Q. You said that she told you that they would like to meet</p>

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<p style="text-align: right;">Page 26</p> <p>1 with you to discuss the possibility of acting as a</p> <p>2 witness, expert witness on cancer inflammation and</p> <p>3 oxidative stress. Was there a reference during that</p> <p>4 call to talc exposure?</p> <p>5 A. No.</p> <p>6 Q. So talc was not brought up --</p> <p>7 A. In the conversation, no.</p> <p>8 Q. -- in the first call. Was the fact that they were</p> <p>9 representing clients or that they were wanting to talk</p> <p>10 to you in connection with a litigation, was that</p> <p>11 discussed?</p> <p>12 A. In the phone call, no.</p> <p>13 Q. Did she identify herself as a lawyer?</p> <p>14 A. Yes, and the firm.</p> <p>15 Q. What was your understanding as far as why a lawyer from</p> <p>16 Beasley Allen would want to talk to you about</p> <p>17 inflammation and oxidative stress?</p> <p>18 A. Because -- so, oh, so you're telling me if she told me</p> <p>19 she is the lawyer on behalf of the defendants, I mean</p> <p>20 the plaintiffs in ovarian cancer cases and talc?</p> <p>21 Q. Yes.</p> <p>22 A. She, yes, she identified herself as such.</p> <p>23 Q. So you understood that the --</p> <p>24 A. Yes.</p> <p>25 Q. -- consulting that you would be doing would be with</p>	<p style="text-align: right;">Page 28</p> <p>1 moment after Mark's question so I can object if I need</p> <p>2 to.</p> <p>3 THE WITNESS: Oh, I'm sorry.</p> <p>4 MS. O'DELL: Thank you.</p> <p>5 THE WITNESS: Where are we now?</p> <p>6 BY MR. HEGARTY:</p> <p>7 Q. Yes, I said -- my question was what analysis of the</p> <p>8 medical literature had you done with regard to talc and</p> <p>9 ovarian cancer prior to the call from Miss Thompson?</p> <p>10 A. Reading the literature.</p> <p>11 Q. What literature had you read?</p> <p>12 A. I read the epidemiology studies, I read some of the</p> <p>13 molecular studies, I read what's in the news, I read</p> <p>14 everything, I listened to the news, that's my interest,</p> <p>15 it's ovarian cancer and inflammation.</p> <p>16 Q. What epidemiologic studies had you read prior to the</p> <p>17 call from Miss Thompson?</p> <p>18 A. I read -- the exact one?</p> <p>19 Q. Yes.</p> <p>20 A. I can't remember exact one, but I read several studies.</p> <p>21 Q. Can you identify the names of any studies, whether by</p> <p>22 author or study name, that you had read prior to the</p> <p>23 call from Miss Thompson?</p> <p>24 MS. O'DELL: Object and asked and answered.</p> <p>25 THE WITNESS: Yeah. I mean I can look it up</p>
<p style="text-align: right;">Page 27</p> <p>1 regard to in some way to talc, correct?</p> <p>2 MS. O'DELL: Object to the form.</p> <p>3 THE WITNESS: No. I was asked to serve as a</p> <p>4 witness expert in my specialty, which is what we did</p> <p>5 and what I do for the last 30 years, ovarian cancer,</p> <p>6 oxidative stress, and inflammation.</p> <p>7 BY MR. HEGARTY:</p> <p>8 Q. As of the time of that phone call, your specialty was</p> <p>9 not talc, correct?</p> <p>10 A. My specialty is anything that induces inflammation and</p> <p>11 oxidative stress that is linked to ovarian cancer.</p> <p>12 Q. But at the time of that first call you had done no</p> <p>13 studies involving talc, correct?</p> <p>14 A. No, no studies, but I was really interested in it</p> <p>15 because of the media reports that's going at the time.</p> <p>16 Q. And at the time of that first call you had done no</p> <p>17 analysis of the medical literature with regard to talc</p> <p>18 and ovarian cancer, correct?</p> <p>19 MS. O'DELL: Objection.</p> <p>20 THE WITNESS: Not correct.</p> <p>21 BY MR. HEGARTY:</p> <p>22 Q. What analysis of the medical literature had you done</p> <p>23 with regard to talc and ovarian cancer prior to the</p> <p>24 call from Miss Thompson?</p> <p>25 MS. O'DELL: Doctor, if you'll give me just a</p>	<p style="text-align: right;">Page 29</p> <p>1 for you, but the cohort study is what I read, and I</p> <p>2 read some other studies. I can't remember exactly.</p> <p>3 BY MR. HEGARTY:</p> <p>4 Q. When in relation to the call from Miss Thompson had you</p> <p>5 read the medical literature you just described?</p> <p>6 A. Sorry, I missed that.</p> <p>7 Q. When in relation to the call from Miss Thompson in</p> <p>8 August of 2017 had you read the literature you just</p> <p>9 talked about, the epi studies, the molecular studies?</p> <p>10 A. Yeah, it's over the past year prior.</p> <p>11 Q. What was it that prompted you to review those materials</p> <p>12 in the first place?</p> <p>13 A. The media reports.</p> <p>14 Q. What media reports?</p> <p>15 A. People talking about the risk of ovarian cancer and</p> <p>16 talc powder use, it was all over the place.</p> <p>17 Q. As of the time that Miss Thompson called, you had done</p> <p>18 no studies yourself involving talc, correct?</p> <p>19 A. Lab studies?</p> <p>20 Q. Lab studies.</p> <p>21 A. No.</p> <p>22 Q. You had done no other study besides reading the</p> <p>23 literature, correct?</p> <p>24 MS. O'DELL: Objection to form.</p> <p>25 THE WITNESS: Other studies related to talc?</p>

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<p style="text-align: right;">Page 30</p> <p>1 BY MR. HEGARTY:</p> <p>2 Q. Correct.</p> <p>3 A. I didn't do any studies related to -- lab studies</p> <p>4 related to talc before that, yes.</p> <p>5 Q. And as of the time that Miss Thompson called you, had</p> <p>6 you formed any opinions with regard to talc and ovarian</p> <p>7 cancer?</p> <p>8 A. Formed an opinion?</p> <p>9 Q. Yes, as to whether there's a causal link between talc</p> <p>10 and ovarian cancer?</p> <p>11 A. It's always my opinion that anything that causes</p> <p>12 inflammation, redox imbalance, is linked to increased</p> <p>13 risk of ovarian cancer. This is the core of my work.</p> <p>14 Q. So it's always been your opinion that anything that</p> <p>15 causes inflammation will cause ovarian cancer?</p> <p>16 MS. O'DELL: Object to the form.</p> <p>17 You may answer.</p> <p>18 THE WITNESS: No. I said that anything that</p> <p>19 induces inflammation, alter the redox balance is</p> <p>20 potential for increasing risk of ovarian cancer, yes.</p> <p>21 BY MR. HEGARTY:</p> <p>22 Q. As of the time that Miss Thompson called you, what</p> <p>23 medical studies reported that talc altered the redox</p> <p>24 balance leading to inflammation?</p> <p>25 A. There was one study of Shukla, I think, and they</p>	<p style="text-align: right;">Page 32</p> <p>1 talc and ovarian cancer?</p> <p>2 A. That talc is a potential inducer of inflammation, and</p> <p>3 it induces and increases risk of ovarian cancer.</p> <p>4 Q. Those opinions came from your review -- from the media</p> <p>5 reports and your review of the literature you</p> <p>6 described?</p> <p>7 A. Uh-huh.</p> <p>8 Q. Is that correct?</p> <p>9 A. Correct.</p> <p>10 Q. With regard to the invoices we marked as Exhibit</p> <p>11 Number 4, do these reflect only your time spent in this</p> <p>12 case?</p> <p>13 A. Correct.</p> <p>14 Q. Are you able to break down from these invoices the</p> <p>15 amount of hours you spent reviewing literature?</p> <p>16 A. From the first one?</p> <p>17 Q. From the first one through the end.</p> <p>18 A. The answer is no, because I always review literature,</p> <p>19 this is my job, that's what I do for a living, I review</p> <p>20 literature every single day.</p> <p>21 Q. After being contacted by Miss Thompson, did you review</p> <p>22 literature with regard to this subject area, talc and</p> <p>23 ovarian cancer, that you had not reviewed before?</p> <p>24 A. Yes.</p> <p>25 Q. Are you able to break down from these invoices the</p>
<p style="text-align: right;">Page 31</p> <p>1 measured the effect of -- they measured the reactive</p> <p>2 oxygen species especially dihydrogen peroxide H2O2, and</p> <p>3 they found a dose response effect when exposure to</p> <p>4 talc.</p> <p>5 Q. From that one study you came to the opinion that --</p> <p>6 A. No.</p> <p>7 Q. -- talc use causes redox imbalance that leads to</p> <p>8 inflammation that leads to ovarian cancer?</p> <p>9 MS. O'DELL: Object to the form.</p> <p>10 THE WITNESS: No. What I said that my</p> <p>11 interest is inflammation and redox balance and</p> <p>12 imbalance and reactive oxygen species, so anything that</p> <p>13 able at the cellular level to alter this, manipulate</p> <p>14 this, is a candidate, is a potential risk to ovarian</p> <p>15 cancer.</p> <p>16 BY MR. HEGARTY:</p> <p>17 Q. As of the time that Miss Thompson called you, had you</p> <p>18 come to the opinion that talc used by women did alter</p> <p>19 the redox balance?</p> <p>20 MS. O'DELL: Objection, asked and answered.</p> <p>21 You may answer.</p> <p>22 THE WITNESS: Repeat the question, please.</p> <p>23 BY MR. HEGARTY:</p> <p>24 Q. Sure. As of the time that you received the call from</p> <p>25 Miss Thompson, what opinion did you have with regard to</p>	<p style="text-align: right;">Page 33</p> <p>1 amount of time you spent writing your expert report?</p> <p>2 A. There is actually one that actually state -- no, no,</p> <p>3 where is it? I thought there was one saying expert</p> <p>4 report. I can identify it, yes.</p> <p>5 Q. You can't identify it?</p> <p>6 A. I can, just give me one second. Yes, it's this one.</p> <p>7 Q. The very last one?</p> <p>8 A. Yes.</p> <p>9 Q. Does the very last one represent the amount of time you</p> <p>10 spent writing your report?</p> <p>11 A. Correct.</p> <p>12 Q. Are you able to break down from the invoices the amount</p> <p>13 of time you spent talking with lawyers for Beasley</p> <p>14 Allen?</p> <p>15 A. No.</p> <p>16 Q. You prepared a manuscript which we'll talk about today</p> <p>17 that has been submitted to the Journal for Reproductive</p> <p>18 Sciences entitled Molecular Basis Supporting the</p> <p>19 Association of Talcum Powder Use With Increased Risk of</p> <p>20 Ovarian Cancer. Are you familiar with that?</p> <p>21 A. Yes.</p> <p>22 Q. Did you bill the time you spent preparing that</p> <p>23 manuscript to lawyers for Beasley Allen?</p> <p>24 A. For this one? Yes.</p> <p>25 Q. Is that reflected in these invoices?</p>

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<p style="text-align: right;">Page 34</p> <p>1 A. Yes.</p> <p>2 Q. Are you able to tell me how much time you spent</p> <p>3 preparing that manuscript that's reflected in the</p> <p>4 invoices we marked as Exhibit Number 4?</p> <p>5 A. Exactly, no.</p> <p>6 Q. Can you approximate it in any way?</p> <p>7 A. Yes.</p> <p>8 Q. What's your approximation?</p> <p>9 A. I would say about 60 to 70 hours.</p> <p>10 Q. There are other authors on that paper, correct?</p> <p>11 A. Correct.</p> <p>12 Q. Did you bill their time to Beasley Allen for their work</p> <p>13 on the manuscript?</p> <p>14 A. No.</p> <p>15 Q. How was their time paid for?</p> <p>16 A. So some of them are, if you look at the names, some of</p> <p>17 them are the department chair, Dr. Morris, and this is</p> <p>18 an academic institution, we don't bill for the time of</p> <p>19 consultants or coworkers or co-authors. The research</p> <p>20 technicians was paid from my lab, and Amy Harper is a</p> <p>21 fellow, OB-GYN oncology fellow, and they're paid for</p> <p>22 fellowships through the department, so we don't bill</p> <p>23 for their time.</p> <p>24 Q. I'm marking as Exhibit Number 5 -- I'm sorry, go ahead.</p> <p>25 A. Go ahead.</p>	<p style="text-align: right;">Page 36</p> <p>1 costs for your talc project that she did on</p> <p>2 December 18, 2018?</p> <p>3 A. I always ask for all my projects accounts.</p> <p>4 Q. Where is the documentation or accounting of the time</p> <p>5 you spent, the lab supplies, the equipment, services,</p> <p>6 isn't there a separate list that breaks down the hours</p> <p>7 or the costs for personnel time and lab supplies,</p> <p>8 equipment, services?</p> <p>9 MS. O'DELL: Objection.</p> <p>10 THE WITNESS: Yeah, so the question is these</p> <p>11 numbers came from breakdown of expenses, receipts. We</p> <p>12 do have receipts for all the expenses from the lab.</p> <p>13 BY MR. HEGARTY:</p> <p>14 Q. Do you have receipts for, that document all the time</p> <p>15 that is under the heading personnel?</p> <p>16 A. So the only personnel that's paid was Dr. Fletcher and</p> <p>17 part-time my research assistant, medical student Ira,</p> <p>18 she was paid part-time, but full-time salary was paid</p> <p>19 for Nicole from this budget.</p> <p>20 Q. Who paid --</p> <p>21 A. That's included in what they call indirect.</p> <p>22 Q. Let me finish, Doctor, who paid for Ira and Nicole's</p> <p>23 time?</p> <p>24 A. My lab.</p> <p>25 Q. When you say your lab, you're talking about your lab at</p>
<p style="text-align: right;">Page 35</p> <p>1 Q. You were saying something.</p> <p>2 A. I said the only time billed to this from the manuscript</p> <p>3 is my time.</p> <p>4 Q. I'm marking this as Exhibit Number 5, a copy of another</p> <p>5 document we were provided in advance of the deposition.</p> <p>6 SAED DEPOSITION EXHIBIT NUMBER 5,</p> <p>7 DECEMBER 18, 2018 DOCUMENT,</p> <p>8 WAS MARKED BY THE REPORTER</p> <p>9 FOR IDENTIFICATION</p> <p>10 BY MR. HEGARTY:</p> <p>11 Q. Can you tell me what Exhibit Number 5 is?</p> <p>12 A. So this is the cost of this project since the beginning</p> <p>13 till now from my lab from my side.</p> <p>14 Q. This listing of costs was sent to you by a Sharon Pepe?</p> <p>15 A. The contract -- the grants and contract manager, yes.</p> <p>16 Q. Who is that?</p> <p>17 A. The financial manager of our department, grants and</p> <p>18 contract.</p> <p>19 Q. How did she come to send you this document on</p> <p>20 December 18, 2018?</p> <p>21 A. How come?</p> <p>22 Q. Yes.</p> <p>23 A. I asked her. Every year they give us a budget balance</p> <p>24 of each account that we have.</p> <p>25 Q. Why did you ask her to send you the accounting of the</p>	<p style="text-align: right;">Page 37</p> <p>1 Wayne State?</p> <p>2 A. Yes.</p> <p>3 Q. And where did the funds come from that your lab could</p> <p>4 use to pay Ira and Nicole?</p> <p>5 A. I have discretion funding for my lab.</p> <p>6 Q. I'm sorry?</p> <p>7 A. I have funds available for me to my lab.</p> <p>8 Q. Who provides those funds?</p> <p>9 A. The department.</p> <p>10 Q. So the department paid for Ira's and Nicole's time to</p> <p>11 work on this talc project?</p> <p>12 A. Correct.</p> <p>13 Q. The total listed there is \$94,957. How much of that</p> <p>14 went to Ira and Nicole?</p> <p>15 A. Most of that went to Nicole, I can't remember exact,</p> <p>16 but most of that went to Nicole because she was a</p> <p>17 full-time post doc at the time.</p> <p>18 Q. Do you know where the department received the funds</p> <p>19 that were used to pay Ira and Nicole?</p> <p>20 MS. O'DELL: Object to the form.</p> <p>21 THE WITNESS: I missed that.</p> <p>22 BY MR. HEGARTY:</p> <p>23 Q. Sure. I think you said the department paid for Ira's</p> <p>24 and Nicole's time. From where did the department get</p> <p>25 the funds they used to pay for Ira and Nicole's time?</p>

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<p>1 A. Let me explain that. So I get fund from the department 2 in the form of an account, and the personnel is billed 3 into this account. 4 Q. So where did the funds come from that you get access 5 to? 6 A. From the department. 7 Q. And where does the department get them from? 8 A. Ask them, I don't know. They have fund for scientists 9 to do, develop. 10 Q. Who would have the receipts of all the expenses and the 11 costs associated with this project? 12 A. Sharon. 13 Q. She notes that the costs listed are for your talc 14 project from October 1, 2017. Is that the date on 15 which the talc project started incurring expenses? 16 A. I think so, yes. 17 Q. The document notes that this does not include your 18 effort costs. What does that mean? 19 A. My salary. 20 Q. Your salary at Wayne State? 21 A. Yes. 22 Q. So you were paid a salary at Wayne State but you were 23 also paid by Beasley Allen to do this talc project, 24 correct? 25 MS. O'DELL: Object to the form.</p>	<p>1 A. I can't. I didn't -- I never thought about it like 2 that. 3 Q. Does Exhibit Number 5 capture all of the personnel, lab 4 supplies, equipment, services, costs for this project? 5 A. From my lab, yes. 6 Q. Have there been any such costs incurred since 7 December 18, 2018? 8 A. What's the last date here? Since what's the -- 9 Q. Since the date of this document, have there been 10 additional costs incurred for the talc project? 11 A. No. 12 Q. Dr. Saed, we were also provided today with what I'm 13 marking as Exhibit Number 6. 14 SAED DEPOSITION EXHIBIT NUMBER 6, 15 COPY OF CHECK DATED 11/2/2017 FOR \$15,000, 16 WAS MARKED BY THE REPORTER 17 FOR IDENTIFICATION 18 BY MR. HEGARTY: 19 Q. Would you please identify for me what Exhibit Number 6 20 is. 21 A. This is a retainer check for my consulting work. 22 Q. Did you ask for a retainer in connection with your 23 consulting work or did they offer to provide that to 24 you? 25 A. I can't remember.</p>
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<p>1 THE WITNESS: I was paid as a consultant for 2 my time. 3 BY MR. HEGARTY: 4 Q. Now, all the work that you did on the talc project was 5 paid for in an hourly way by Beasley Allen, correct? 6 A. No. 7 Q. What time that you spent on the talc project was not 8 paid for by Beasley Allen? 9 A. It's the time I spent in the lab doing my duties. 10 Q. The time you spent in the lab doing your duties on this 11 project? 12 A. On this project, on other projects, too. 13 Q. So there was time you spent on the talc project that 14 you did not bill to Beasley Allen? 15 A. Correct. 16 Q. How did you divide that, the time that you did bill 17 Beasley Allen for on the talc project and the time you 18 didn't? 19 A. So the time I work for extra, additional work, I billed 20 them, like overtime, I worked Saturdays, I worked 21 weekends, I write, I read. 22 Q. Can you estimate the amount of time that you spent on 23 the talc project that you did not bill Beasley Allen? 24 A. Hour, hours you're talking? 25 Q. By hours.</p>	<p>1 Q. With regard to the invoices and the retainer, have you 2 been paid for all the invoices? 3 A. I have been paid for these invoices, yes. 4 Q. So with regard to the amount of the check, that was 5 \$15,000, correct? 6 A. The retainer check? Yes. 7 Q. Yes, and the date of the invoice is October 19, 2017? 8 A. Which invoice? 9 MS. O'DELL: Object to the form. 10 THE WITNESS: Which invoice? 11 BY MR. HEGARTY: 12 Q. Well, there's an invoice date listed at the bottom of 13 the check of October 19, 2017. Do you see that? 14 MS. O'DELL: I would just state for the 15 record that there are no additional invoices, that that 16 is my belief that data was put in by our Accounting 17 Department when the request was made, so there's no 18 invoice that has not been disclosed if that's -- 19 MR. HEGARTY: That was going to be my next 20 question. 21 The date of the check is November 2nd, 2017, 22 correct? 23 THE WITNESS: Correct. 24 BY MR. HEGARTY: 25 Q. And all these funds went to you, correct?</p>

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<p>1 A. The 15,000?</p> <p>2 Q. Yes.</p> <p>3 A. Yes.</p> <p>4 SAED DEPOSITION EXHIBIT NUMBER 7,</p> <p>5 MOLECULAR BASIS SUPPORTING THE ASSOCIATION OF</p> <p>6 TALCUM POWDER USE WITH INCREASED RISK OF OVARIAN</p> <p>7 CANCER, WAS MARKED BY THE REPORTER</p> <p>8 FOR IDENTIFICATION</p> <p>9 BY MR. HEGARTY:</p> <p>10 Q. I'm going to mark next as Exhibit Number 7 a copy of a</p> <p>11 manuscript we've been provided, which I referenced</p> <p>12 earlier, the manuscript that I marked as Exhibit</p> <p>13 Number 7 is entitled Molecular Basis Supporting the</p> <p>14 Association of Talcum Powder Use With Increased Risk of</p> <p>15 Ovarian Cancer. Do you see what I'm referring to,</p> <p>16 Doctor?</p> <p>17 A. Yes.</p> <p>18 Q. First of all, is this the current version of the paper</p> <p>19 you submitted to Reproductive Sciences?</p> <p>20 A. Yes.</p> <p>21 Q. Do you have prior drafts of this paper in your office</p> <p>22 or in your possession?</p> <p>23 A. Do I have drafts?</p> <p>24 Q. Correct.</p> <p>25 A. Like --</p>	<p>1 submitted by the author section says January 3rd, 2019,</p> <p>2 which is after December 26, 2018. So my question is</p> <p>3 where is the manuscript that was submitted before</p> <p>4 December 26, 2018?</p> <p>5 A. Okay. So when you submit a manuscript, they return</p> <p>6 they usually give you some corrections or editing to</p> <p>7 do, and then you do the editing, and then you resubmit</p> <p>8 the manuscript, so I have both copies. Are you</p> <p>9 interested to see the one that went to revision versus</p> <p>10 the one after revision?</p> <p>11 Q. You have the copy that you initially sent to</p> <p>12 Reproductive Sciences which is the one referred to in</p> <p>13 the e-mail of December 26, 2018?</p> <p>14 A. Sure.</p> <p>15 Q. Are there only two drafts of the manuscript, the one</p> <p>16 you submitted prior to December 26, 2018 and the one we</p> <p>17 marked as Exhibit Number 7?</p> <p>18 A. For Reproductive Science, yes.</p> <p>19 Q. Have you made any revisions to the document that we</p> <p>20 have marked as Exhibit Number 7?</p> <p>21 A. Let's see if I remember, so this is the first -- which</p> <p>22 one is this, okay, because there is one original that</p> <p>23 we submitted.</p> <p>24 Q. Correct.</p> <p>25 A. Went to review, the reviewer asked for some</p>
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<p>1 Q. Well, let me explain. Go to the very last page of</p> <p>2 Exhibit Number 7.</p> <p>3 A. Okay.</p> <p>4 Q. Very last page.</p> <p>5 A. Okay.</p> <p>6 Q. There's an e-mail there.</p> <p>7 A. Oh.</p> <p>8 Q. Of December 26, 2018, which would indicate that you</p> <p>9 submitted the paper in advance of that date, yet on the</p> <p>10 first page of Exhibit Number 7 it reports the date</p> <p>11 submitted by the author of January 3rd, 2019. So there</p> <p>12 must have been a prior manuscript submitted to</p> <p>13 Reproductive Sciences before Exhibit Number 7, correct?</p> <p>14 A. Hold on. I need to digest this. Can you repeat that,</p> <p>15 please?</p> <p>16 Q. Sure.</p> <p>17 A. What are we talking about?</p> <p>18 Q. The e-mail that you're looking at is dated December 26,</p> <p>19 2018, correct?</p> <p>20 A. Yes.</p> <p>21 Q. That e-mail refers to a manuscript you had submitted,</p> <p>22 which would have been submitted before that date,</p> <p>23 correct?</p> <p>24 A. Yes.</p> <p>25 Q. The first page of Exhibit Number 7 in the date</p>	<p>1 modification, I did it and resubmit it.</p> <p>2 Q. Is Exhibit Number -- I'm sorry, go ahead.</p> <p>3 A. So this, I can't remember is this the most recent one</p> <p>4 or not.</p> <p>5 Q. Did you bring a copy today?</p> <p>6 A. I have a copy.</p> <p>7 Q. You brought a copy from your office?</p> <p>8 A. Yeah, this is a copy from my office.</p> <p>9 Q. May I see it, please?</p> <p>10 A. Yes.</p> <p>11 SAED DEPOSITION EXHIBIT NUMBER 8,</p> <p>12 MOLECULAR BASIS SUPPORTING THE ASSOCIATION OF</p> <p>13 TALCUM POWDER USE WITH INCREASED RISK OF OVARIAN</p> <p>14 CANCER,</p> <p>15 WAS MARKED BY THE REPORTER</p> <p>16 FOR IDENTIFICATION</p> <p>17 BY MR. HEGARTY:</p> <p>18 Q. I'm going to mark as Exhibit Number 8 a copy of the</p> <p>19 article or manuscript that Dr. Saed just provided to</p> <p>20 me. At least the cover page contains the same date</p> <p>21 submitted by the author date. Would you look at the</p> <p>22 two Exhibit Number 7 and Exhibit Number 8, and tell me</p> <p>23 whether they are the same?</p> <p>24 A. Yeah, it looks the same to me.</p> <p>25 Q. So have there been any additional revisions to the</p>

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<p style="text-align: right;">Page 46</p> <p>1 manuscript that we've marked as 7 and 8?</p> <p>2 A. No. We revised it according to the reviewer's comment</p> <p>3 and resubmitted it, and then it was officially</p> <p>4 accepted.</p> <p>5 Q. Did you submit the manuscript to any other journals?</p> <p>6 A. Prior to this?</p> <p>7 Q. Prior to this.</p> <p>8 A. Yes.</p> <p>9 Q. What journals did you submit to?</p> <p>10 A. OB-GYN Oncology.</p> <p>11 Q. When did you submit the manuscript to OB-GYN Oncology?</p> <p>12 A. I'm not good on dates.</p> <p>13 Q. You submitted it before --</p> <p>14 A. Prior.</p> <p>15 Q. Prior to submitting it to Reproductive Sciences?</p> <p>16 A. Correct.</p> <p>17 Q. Are you able to estimate when you completed the</p> <p>18 manuscript such that it could be submitted to a</p> <p>19 journal?</p> <p>20 A. I would say -- what's the date now -- September,</p> <p>21 October, September maybe around.</p> <p>22 Q. Did you get a response from OB-GYN Oncology to your</p> <p>23 submission?</p> <p>24 A. I did.</p> <p>25 Q. What was their response?</p>	<p style="text-align: right;">Page 48</p> <p>1 A. Correct.</p> <p>2 Q. They, based on correspondence with you, sent that paper</p> <p>3 to peer reviewers, correct?</p> <p>4 A. Correct.</p> <p>5 Q. How many peer reviewers did they send it to?</p> <p>6 A. I don't know.</p> <p>7 Q. How many comments back from peer reviewers did you</p> <p>8 receive, just by peer reviewer number?</p> <p>9 A. I know, but I'm trying to remember, maybe one or two, I</p> <p>10 can't remember, I think two.</p> <p>11 Q. You mentioned one of the comments was --</p> <p>12 A. But two that they commented. So usually they send it</p> <p>13 to more. If they have no comments, they don't include</p> <p>14 them.</p> <p>15 Q. One of the reviewers commented that you needed to do</p> <p>16 additional in vivo animal studies to show the same</p> <p>17 effect that you reported in cell cultures that you did,</p> <p>18 correct?</p> <p>19 MS. O'DELL: Object to form.</p> <p>20 THE WITNESS: No.</p> <p>21 BY MR. HEGARTY:</p> <p>22 Q. What did he say or she say?</p> <p>23 A. It was said that this is very exciting work,</p> <p>24 interesting work, has a biological relevance, it would</p> <p>25 be interesting to see if this can be shown in vivo.</p>
<p style="text-align: right;">Page 47</p> <p>1 A. That I needed to do in vivo, additional in vivo animal</p> <p>2 experiments.</p> <p>3 Q. That you needed to do additional in vivo animal</p> <p>4 experiments before they would agree to publish your</p> <p>5 paper; is that correct?</p> <p>6 A. No, they -- usually the basis of their rejection, this</p> <p>7 is a review of comment, not the editor request, so</p> <p>8 comments you can do, you can agree with or you can</p> <p>9 disagree with. So I always publish papers and I'm very</p> <p>10 familiar with this process. So there's a distinction</p> <p>11 between editor's opinion and reviewer's comment. So</p> <p>12 reviewer comments, they're not bound -- I'm not bound</p> <p>13 to their comments. I may agree with them and I may</p> <p>14 disagree with them. So the reviewer -- the editor,</p> <p>15 they usually, their policy, they use it based on</p> <p>16 reviewer's comment, that's part of the concentration,</p> <p>17 the other part will be the how many -- the volume, how</p> <p>18 many they receive and priority for the articles to be</p> <p>19 published.</p> <p>20 Q. So as to the chronology, you completed a draft of your</p> <p>21 manuscript that we marked as Exhibit Number 7 and 8,</p> <p>22 you submitted that manuscript initially to OB-GYN</p> <p>23 Oncology --</p> <p>24 A. Correct.</p> <p>25 Q. -- in the September 2018 time frame?</p>	<p style="text-align: right;">Page 49</p> <p>1 Q. Do you remember anything else that was said in those</p> <p>2 comments besides what you provided to us this morning?</p> <p>3 A. Yeah, they like it, they love my work.</p> <p>4 Q. Anything else you can recall from the comments?</p> <p>5 A. No, this is positive and it's good data that they need</p> <p>6 to -- complimented with.</p> <p>7 Q. So with regard to the comments, then what -- strike</p> <p>8 that. OB-GYN Oncology rejected your paper, correct?</p> <p>9 A. They said that -- yeah, they said that we don't want --</p> <p>10 priority at this time.</p> <p>11 Q. Did they say why they rejected your paper?</p> <p>12 A. They say we have lot of papers received by the journal</p> <p>13 and it's not a priority right now.</p> <p>14 Q. Do you have all the documents of your submission to</p> <p>15 OB-GYN Oncology and their -- the comments and other</p> <p>16 documents that you received back in connection with</p> <p>17 that submission?</p> <p>18 MS. O'DELL: Object to the form.</p> <p>19 BY MR. HEGARTY:</p> <p>20 Q. Yes?</p> <p>21 A. I want to see -- what's the question? Sorry.</p> <p>22 Q. Sure. Do you have the documentation, all the documents</p> <p>23 of your submission to OB-GYN Oncology and their</p> <p>24 response back?</p> <p>25 A. You mean the manuscript?</p>

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<p style="text-align: right;">Page 50</p> <p>1 Q. The manuscript, your cover letter, the letter back, the</p> <p>2 comments, the comments you received back, do you have</p> <p>3 all that material?</p> <p>4 A. Yes.</p> <p>5 Q. Is that back in your office?</p> <p>6 A. It's in my office, yes. You talking about manuscript,</p> <p>7 right?</p> <p>8 Q. Well, the manuscript and the reviewer comments.</p> <p>9 A. And the reviewer comments, yes.</p> <p>10 Q. You chose not to do or try to replicate your results in</p> <p>11 an in vivo animal model, correct?</p> <p>12 A. No, it's not correct, I didn't choose, I just don't</p> <p>13 have the time to do it and the money.</p> <p>14 Q. Did you submit your manuscript to any other journals</p> <p>15 besides OB-GYN Oncology and Reproductive Sciences?</p> <p>16 A. No.</p> <p>17 Q. How did you choose to submit your journal first to</p> <p>18 OB-GYN Oncology? Why did you choose that journal?</p> <p>19 A. Those, the OB-GYN Oncology and Reproductive Sciences</p> <p>20 are the major societies for our specialty, and most</p> <p>21 readers -- OB-GYN readers read those two manuscripts, I</p> <p>22 mean journals.</p> <p>23 Q. Of your specialty, which specialty is that?</p> <p>24 A. Like our -- like in the field of OB-GYN research.</p> <p>25 Q. And what resource do you have that Reproductive</p>	<p style="text-align: right;">Page 52</p> <p>1 does it represent all the work that you did that went</p> <p>2 into the paper we marked as Exhibit Number 7?</p> <p>3 MS. O'DELL: Object to the form.</p> <p>4 THE WITNESS: So, yeah, so this part starting</p> <p>5 here, from here all the way to the end, that represents</p> <p>6 everything in the manuscript.</p> <p>7 BY MR. HEGARTY:</p> <p>8 Q. You're pointing to 30?</p> <p>9 A. From here, yes.</p> <p>10 MS. O'DELL: To the end.</p> <p>11 THE WITNESS: To the end.</p> <p>12 BY MR. HEGARTY:</p> <p>13 Q. What is contained in Pages 1 through 29?</p> <p>14 A. This is like preliminary trials that we were running,</p> <p>15 testing, so forth, the talc.</p> <p>16 Q. Do Pages 1 through 29 represent activities as part of</p> <p>17 the work that generated the results contained on</p> <p>18 Pages 30 thereafter?</p> <p>19 A. No.</p> <p>20 Q. What does it represent, then?</p> <p>21 A. It's a trial, it's a pilot experiment to tune-up the</p> <p>22 technique.</p> <p>23 Q. When did this -- this pilot experiment goes back, at</p> <p>24 least based on the date of the notebook, to 10-15-17?</p> <p>25 A. Correct.</p>
<p style="text-align: right;">Page 51</p> <p>1 Sciences is a journal that most in your specialty</p> <p>2 review or read?</p> <p>3 MS. O'DELL: Object to the form.</p> <p>4 THE WITNESS: I mean do I have a number? Or</p> <p>5 you mean the source where I got that from?</p> <p>6 BY MR. HEGARTY:</p> <p>7 Q. Yeah, where did you get that from?</p> <p>8 A. From my experience with them for the last 25 years.</p> <p>9 Q. Have you published in that journal before?</p> <p>10 A. Yes.</p> <p>11 Q. Have you published in OB-GYN Oncology before?</p> <p>12 A. Yes.</p> <p>13 Q. Is there such a thing as something called an impact</p> <p>14 factor of a journal?</p> <p>15 A. Correct.</p> <p>16 Q. Do you know what the impact factor is of Reproductive</p> <p>17 Sciences?</p> <p>18 A. About 3, 2.8 something.</p> <p>19 Q. How about OB-GYN Oncology?</p> <p>20 A. 4, the upper 5, the upper 4, 5, 4.6, 5 maybe.</p> <p>21 Q. We were also, as we talked earlier, provided with the</p> <p>22 original lab notebook that -- in connection with the</p> <p>23 article that you have submitted to Reproductive</p> <p>24 Sciences and that you submitted to OB-GYN Oncology. Is</p> <p>25 what we've designated as Exhibit Number 2 all of the --</p>	<p style="text-align: right;">Page 53</p> <p>1 Q. Is it -- do you always do pilot experiments before you</p> <p>2 do an experiment like this?</p> <p>3 A. Sure.</p> <p>4 Q. Why do you always do a pilot experiment?</p> <p>5 A. You need to figure out the right conditions, right</p> <p>6 concentration, the right incubation time.</p> <p>7 Q. And how does a pilot study provide that information?</p> <p>8 A. I don't understand what you mean.</p> <p>9 Q. How does a pilot study provide you with information to</p> <p>10 know you're using the right conditions, the right</p> <p>11 concentration?</p> <p>12 A. So when you use a concentration of 1,000 microgram per</p> <p>13 ml and it kills your cells, you know it's toxic, you</p> <p>14 should go lower.</p> <p>15 Q. Is that what you did here?</p> <p>16 A. Yes.</p> <p>17 Q. Do you do any other testing like that to determine the</p> <p>18 parameters of your later tests?</p> <p>19 A. Sorry, I don't understand.</p> <p>20 Q. Well the test you just described is sort of that it, it</p> <p>21 sort of set an upper limit of where you could go before</p> <p>22 you kill the cells, right?</p> <p>23 MS. O'DELL: Object.</p> <p>24 THE WITNESS: Just an example, I'm giving you</p> <p>25 an example.</p>

14 (Pages 50 to 53)

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<p>1 BY MR. HEGARTY:</p> <p>2 Q. An example. Do you recall anything specific that you</p> <p>3 did in the pilot study that helped you define the</p> <p>4 parameters of the later study that you did?</p> <p>5 A. Other than the dose, most of the technology and the</p> <p>6 methods that we used, it's really standard in our</p> <p>7 laboratory, we have published them, we -- and not just</p> <p>8 us, it's standard accepted technology everywhere in</p> <p>9 this field.</p> <p>10 Q. And how did the pilot study that's reflected in Exhibit</p> <p>11 Number 2 inform you as to the studies -- study that you</p> <p>12 did that are reflected in the rest of the pages?</p> <p>13 A. Yes, so basically we looked at the dose here and this</p> <p>14 pilot study showing that the initial dose was high and</p> <p>15 it was like 500 microgram per ml to a thousand, that's</p> <p>16 how we started, and we figured out that this dose</p> <p>17 killed the cells and induced some toxicity, so this is</p> <p>18 why we learned from this, and then we turned up the</p> <p>19 CA-125 assay, this is turning up the assay to see how</p> <p>20 much you need to use. Is it from the media? Is it</p> <p>21 from the cell? You need to set up all this, and this</p> <p>22 is done in here, and it's described, it's not hidden,</p> <p>23 it's all over, it's all here. But we determined</p> <p>24 basically the dose, and we figured out what is toxic to</p> <p>25 the cells.</p>	<p>1 BY MR. HEGARTY:</p> <p>2 Q. Are you confident that it was one or the other?</p> <p>3 A. Yes.</p> <p>4 Q. The lab notebook that we've been provided marked as</p> <p>5 Exhibit Number 2 has a first date of 10-15-17. Is that</p> <p>6 the first date that there was any lab work done either</p> <p>7 in the pilot study or the later study?</p> <p>8 A. No.</p> <p>9 Q. What is the earliest date of work?</p> <p>10 A. May I have this?</p> <p>11 Q. Yeah, I'm handing you Exhibit Number 3.</p> <p>12 A. So the first work that we did with talc, 9-26.</p> <p>13 Q. Dr. Saed referred to Exhibit Number 3 and pointed me to</p> <p>14 a page that's dated 9-26. First of all, what is</p> <p>15 represented or contained in Exhibit Number 3, this lab</p> <p>16 notebook?</p> <p>17 A. So this part, okay, so I have to indicate something, we</p> <p>18 share lab notebook, we use them for -- so not</p> <p>19 necessarily one lab notebook for one project. So, for</p> <p>20 example, the first part of this lab notebook --</p> <p>21 MS. O'DELL: Which is Exhibit 3.</p> <p>22 THE WITNESS: -- which is Exhibit 3, looking</p> <p>23 at the effect of a dipeptide on adhesion markers, and</p> <p>24 then we continued with talc, so sometimes we mix up,</p> <p>25 like we don't necessarily use one project for one lab</p>
Page 55	Page 57
<p>1 Q. How did you come to start with the 500 milligram per</p> <p>2 milliliter dose?</p> <p>3 A. So we read in the literature prior experiments people</p> <p>4 did from 5 all the way to 1,000, and I found the paper</p> <p>5 after we did -- we thought first initial experiment we</p> <p>6 will hit the cells with high concentration, see what</p> <p>7 happened, and then titrate it down, but then we found</p> <p>8 it's toxic effect on the cells so -- and then I came</p> <p>9 across a paper where they used these small doses that</p> <p>10 they found biological effect with, and they used 5, 20</p> <p>11 and 100 and up to 500, so I chose the lower range,</p> <p>12 which is 5, 20, and 100 for my study.</p> <p>13 Q. What paper was that?</p> <p>14 A. That was -- do you have that paper --</p> <p>15 Q. Is that the Buz'Zard paper?</p> <p>16 A. Let me see, do you have the Buz'Zard --</p> <p>17 MS. O'DELL: It's right in your notebook</p> <p>18 there, Doctor.</p> <p>19 THE WITNESS: Where do I find it now here?</p> <p>20 MS. O'DELL: You might look in your</p> <p>21 references of your report.</p> <p>22 THE WITNESS: Right.</p> <p>23 MS. O'DELL: And then we can go from there.</p> <p>24 THE WITNESS: I think it's Buz'Zard or</p> <p>25 Shukla, one or the other, I can't remember.</p>	<p>1 notebook, okay. So this part of the notebook --</p> <p>2 BY MR. HEGARTY:</p> <p>3 Q. The first part?</p> <p>4 A. The first part is for the different study. This part</p> <p>5 where we started the actual work with talc.</p> <p>6 Q. When you -- you started referencing the pages, this</p> <p>7 part, then what does this part represent being done?</p> <p>8 A. This part was an experiment that we did exposing cells,</p> <p>9 ovarian cancer cells, to talc, Fisher, and look at</p> <p>10 oxidative stress markers. We used three ovarian cancer</p> <p>11 cell lines, and we used macrophages of normal</p> <p>12 epithelial cells. And the result of this work was</p> <p>13 submitted to Society of Reproductive Investigation</p> <p>14 meeting that was held last year March, yes, last year</p> <p>15 in San Diego, and you can see all the way down, this is</p> <p>16 the poster that resulted from this work.</p> <p>17 Q. The poster you pointed to is on Page 63?</p> <p>18 A. Yes.</p> <p>19 Q. Was there a pilot study done before doing this</p> <p>20 experiment?</p> <p>21 A. So this is a pilot study.</p> <p>22 Q. So the study that we are looking at dated -- with the</p> <p>23 start date of 9-26-2017 --</p> <p>24 A. Right.</p> <p>25 Q. -- you consider that to be a pilot study?</p>

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<p style="text-align: right;">Page 58</p> <p>1 A. This is a -- we have many pilot studies. It depends on 2 what marker you're doing the pilot study for. So 3 there's a pilot study for CA-125. There is a pilot 4 study for the dose. There is a pilot study for cells. 5 So this is a pilot study. 6 Q. In the other notebook you went from a pilot study to 7 doing a subsequent study. 8 A. Correct. 9 Q. Did you do that with this pilot study? 10 A. No, this is only done with -- this is a preliminary 11 study that we did, and we only tested mRNA levels of 12 some oxidative stress markers. The other study that 13 you're referring to with the manuscript, this is a 14 comprehensive study that looked at every fold of gene 15 expression from mRNA to DNA to ELISA to activity of 16 proteins, everything. This is just simply a pilot 17 experiment looking at, yes, there is an effect, no, 18 there is not an effect, and, yes, there is an effect, 19 so we published it. 20 Q. The first date of any study that you did with talc is 21 September 26, 2017? 22 A. Correct. 23 Q. Who is involved in the study that we looked at in 24 Exhibit Number 3 whose begin date was September 26, 25 2017?</p>	<p style="text-align: right;">Page 60</p> <p>1 call from Miss Thompson, you would have still done 2 these studies? 3 A. Correct. 4 Q. Were the studies in the works at the time that Miss 5 Thompson called you? 6 A. I was reviewing literature only. 7 Q. You had not thought about doing actual laboratory 8 studies before Miss Thompson had called you involving 9 talc? 10 A. I planned it before she called me. 11 Q. You had actually planned to do laboratory studies? 12 A. Correct. 13 Q. Do you have any documentation of that plan? 14 A. No. 15 Q. Did you talk with anyone and tell them that your plan 16 was to do studies involving talc before you were called 17 by Miss Thompson? 18 A. We always discussed talking about looking at any 19 substance that induces inflammation and oxidative 20 stress. So we always talk in the lab and with 21 colleagues about any substance. Talc was brought up, 22 yes. 23 Q. To whom did you speak with about talc and doing an 24 experiment about talc before you received a call from 25 Miss Thompson?</p>
<p style="text-align: right;">Page 59</p> <p>1 A. That's Nicole King and Ira, and myself. 2 Q. What prompted you to do this initial study? 3 A. My lab interest is ovarian cancer and oxidative stress, 4 we talked about that, I answered that, the media and, 5 you know, what's going on, and this is the core of my 6 lab specialty is looking at oxidative stress markers, 7 inflammation, and ovarian cancer. 8 Q. Is it your testimony that this study with the start 9 date of 9-26-2017 was not prompted by your call with 10 Miss Thompson? 11 MS. O'DELL: Object to the call. 12 THE WITNESS: Was not prompted? 13 BY MR. HEGARTY: 14 Q. Yes. 15 MS. O'DELL: Object to the form. 16 BY MR. HEGARTY: 17 Q. In other words, you would not have done this study or 18 the study for which you have submitted a manuscript to 19 Reproductive Sciences if Miss Thompson had not called 20 you, correct? 21 MS. O'DELL: Object to the form. 22 THE WITNESS: No, I was always interested in 23 doing this. 24 BY MR. HEGARTY: 25 Q. So it's your testimony that if you had not gotten a</p>	<p style="text-align: right;">Page 61</p> <p>1 A. I discussed with Nicole. 2 Q. When was that discussion? 3 A. I can't remember dates, but we always discussed markers 4 of oxidative stress. 5 Q. Well, you said that you always talk in the lab and with 6 colleagues about any substance. Talc was brought up. 7 A. Correct. 8 Q. What substances had you tested in your lab with regard 9 to oxidative stress before your study about talc? 10 A. We go backwards, we go looking at reducing oxidative 11 stress and looking at mechanisms, or manipulating 12 alteration of oxidative stress, like, for example, we 13 did the work where we added a scavenger of Superoxide 14 dismutase, which is a very powerful oxidant, and we 15 looked at inducing apoptosis in ovarian cancer cells. 16 We're looking at intervention, changing the cell redox 17 balance, alteration of that balance, it is given, it's 18 accepted in the literature and in our world that cancer 19 cells and ovarian cancer cells included, they all have 20 characterized by a pro-oxidant state that is given, 21 it's known. So we don't need to show a substance that 22 induces further that oxidative stress. We are looking 23 for attenuating and modulating that oxidative stress 24 and see the effect, the downstream effect. We have 25 done that, we have published that with looking at SRNA</p>

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<p style="text-align: right;">Page 62</p> <p>1 to shut down proteins, knock down proteins, we did it</p> <p>2 for myeloperoxidase, we did it for ionase, we did it</p> <p>3 for SOD so.</p> <p>4 Q. But prior to the call you received from Miss Thompson,</p> <p>5 you had never tested any particulate or exposed cells</p> <p>6 to any particulate and looked for oxidative stress,</p> <p>7 correct?</p> <p>8 A. No, not correct. I used hypoxia, induced hypoxia and</p> <p>9 look at normal cells.</p> <p>10 Q. What particles did you apply to cells in that study?</p> <p>11 A. Hypoxia.</p> <p>12 Q. What's hypoxia?</p> <p>13 A. It is the creation of a hypoxic micro environment into</p> <p>14 the cells. This can be in vivo induced by infection,</p> <p>15 by wound, by many other factors that do that.</p> <p>16 Q. Let me clarify my question, then. My question is what</p> <p>17 environmental particles that are not generated in vivo</p> <p>18 had you ever applied to cells and culture prior to the</p> <p>19 call from Miss Thompson?</p> <p>20 A. That we published? I don't -- like a given particle</p> <p>21 you're talking about?</p> <p>22 Q. Correct.</p> <p>23 A. No, I don't have any, I never done anything like that.</p> <p>24 Q. What studies had you actually planned on doing with</p> <p>25 talc before your call -- before the call came from Miss</p>	<p style="text-align: right;">Page 64</p> <p>1 Q. -- informal about putting a test together, correct?</p> <p>2 A. I said I was planning to do this.</p> <p>3 Q. Okay.</p> <p>4 A. I had a plan to do this.</p> <p>5 Q. Okay. What was your plan?</p> <p>6 A. This is the plan -- the plan -- okay, this is important</p> <p>7 to know, that I have this set up ready in my lab, ready</p> <p>8 to go. We have all the technology for all these</p> <p>9 markers. So it is not hard just to add -- so when I</p> <p>10 plan, it means I -- we had used the setup that I</p> <p>11 already have in my laboratory, that's what I -- in my</p> <p>12 plan.</p> <p>13 Q. But you had not done anything to further that plan?</p> <p>14 A. Physically, no.</p> <p>15 Q. Let me finish, you had not done anything to further</p> <p>16 that plan until after the call came from Miss Thompson,</p> <p>17 correct?</p> <p>18 A. Correct.</p> <p>19 Q. Did you discuss at all the makeup of the study or what</p> <p>20 you were going to do with the study or the methods of</p> <p>21 the study with Beasley Allen before you did them?</p> <p>22 A. No.</p> <p>23 Q. Did you have any discussions at all with attorneys for</p> <p>24 Beasley Allen about the concept of the study, the</p> <p>25 methods of the study, the protocol of the study, how</p>
<p style="text-align: right;">Page 63</p> <p>1 Thompson? Had you actually formed the framework of a</p> <p>2 study?</p> <p>3 A. No, I was just thinking about the overall, it would be</p> <p>4 interesting to see if this is -- this will induce</p> <p>5 inflammation in our cells, and if it does, then it</p> <p>6 should be linked to the risk of ovarian cancer, so</p> <p>7 thinking, just talking about it.</p> <p>8 Q. With regard to the manuscript that -- strike that.</p> <p>9 With regard to the tests that were part of the</p> <p>10 manuscript, those tests were done in connection with</p> <p>11 your communications with Beasley Allen, correct?</p> <p>12 A. Those tests?</p> <p>13 Q. Yes.</p> <p>14 A. What do you mean by communication?</p> <p>15 MS. O'DELL: Object to form.</p> <p>16 BY MR. HEGARTY:</p> <p>17 Q. Well, you talked with Beasley Allen about doing those</p> <p>18 tests, correct, before you did them?</p> <p>19 MS. O'DELL: Object to the form.</p> <p>20 THE WITNESS: No, I was planning to do them,</p> <p>21 anyways.</p> <p>22 BY MR. HEGARTY:</p> <p>23 Q. You just said, though, before the call you had not done</p> <p>24 anything formal or even --</p> <p>25 A. Yeah, I said --</p>	<p style="text-align: right;">Page 65</p> <p>1 the study was going to be done, anything like that?</p> <p>2 MS. O'DELL: Let me just stop you right</p> <p>3 there. I think when you're talking about conversations</p> <p>4 you -- you're talking about after the time that he's</p> <p>5 been engaged by Beasley Allen and those discussions</p> <p>6 would be protected by the privilege. I'm going to</p> <p>7 instruct the witness not to answer.</p> <p>8 MR. HEGARTY: Well, my questions are related</p> <p>9 solely to the manuscript, the testing in the manuscript</p> <p>10 that has been submitted to Reproductive Sciences. So</p> <p>11 is it your position that all the communications you had</p> <p>12 with regard to the tests done for purposes of the</p> <p>13 publication Reproductive Sciences and the writing of</p> <p>14 the article, submission of the article, are protected</p> <p>15 by the consulting privilege?</p> <p>16 MS. O'DELL: Well, and as you know, the</p> <p>17 substance of the manuscript largely is Dr. Saed's</p> <p>18 expert report, and the work that he did in terms of</p> <p>19 consulting was paid for by Beasley Allen and he was</p> <p>20 doing that as a part of the consulting arrangement.</p> <p>21 So, yes, to the degree he had conversations with the</p> <p>22 lawyers, we're going to -- I'm going to instruct him</p> <p>23 not to answer.</p> <p>24 MR. HEGARTY: I'm not going to argue with</p> <p>25 you. I just want to make sure I'm interesting that</p>

17 (Pages 62 to 65)

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<p style="text-align: right;">Page 66</p> <p>1 that's -- that your objection extends to any question</p> <p>2 that I would ask with regard to communications with</p> <p>3 Beasley Allen or attorneys for the plaintiffs with</p> <p>4 regard to the creation of the study, the setup of the</p> <p>5 study, the protocol of the study, doing the study,</p> <p>6 writing the manuscript.</p> <p>7 MS. O'DELL: That was not, your question's a</p> <p>8 little bit different than what you just described. You</p> <p>9 can ask your questions, there may be some that are</p> <p>10 appropriate and some not, but as regard the question</p> <p>11 that's on the table, I think that's inappropriate and</p> <p>12 I've instructed him not to answer.</p> <p>13 BY MR. HEGARTY:</p> <p>14 Q. Dr. Saed, did you have any discussions with any</p> <p>15 attorneys for Beasley Allen regarding the pilot study</p> <p>16 that we talked about in Exhibit Number 3?</p> <p>17 A. What's Exhibit Number 3?</p> <p>18 Q. The one -- the study that's dated 9-26-2007.</p> <p>19 MS. O'DELL: Objection, vague.</p> <p>20 THE WITNESS: Again, okay, here is my answer.</p> <p>21 No one has interfered with the design of the study, how</p> <p>22 the study should be done, what assay should be applied,</p> <p>23 what method of analysis should be performed, the</p> <p>24 writing of the results, the analysis of the results,</p> <p>25 this is my world, this is my specialty. No one</p>	<p style="text-align: right;">Page 68</p> <p>1 Number --</p> <p>2 A. My lab.</p> <p>3 Q. Sorry let me finish.</p> <p>4 A. We already talked.</p> <p>5 Q. Who paid for the pilot study that's reported in Exhibit</p> <p>6 Number 3?</p> <p>7 MS. O'DELL: Object to the form, to the</p> <p>8 degree it's vague.</p> <p>9 MR. HEGARTY: You can answer.</p> <p>10 THE WITNESS: We discussed this, right?</p> <p>11 BY MR. HEGARTY:</p> <p>12 Q. Now, the before questions, at least I thought, were</p> <p>13 limited to the lab costs for -- and personnel costs for</p> <p>14 the study in exhibit -- in the first notebook, Number</p> <p>15 2. Did those lab costs reflected in that exhibit,</p> <p>16 which is Exhibit Number 5, also cover the pilot study</p> <p>17 that's in notebook that we marked as Exhibit Number 3?</p> <p>18 A. The answer, my lab is paid for -- paid for all the</p> <p>19 studies that we did.</p> <p>20 Q. The --</p> <p>21 A. Yeah, you can go back five days later.</p> <p>22 Q. Exhibit Number 5 reports the costs of the talc project</p> <p>23 dated from October 1st, 2017. This pilot study began</p> <p>24 on September 26, 2017 correct?</p> <p>25 A. Correct.</p>
<p style="text-align: right;">Page 67</p> <p>1 interfered with that.</p> <p>2 BY MR. HEGARTY:</p> <p>3 Q. I appreciate that. That was not my question. My</p> <p>4 question was simply did you have any discussions with</p> <p>5 attorneys for Beasley Allen or attorneys for plaintiffs</p> <p>6 in this case with regard to conducting the pilot study</p> <p>7 that's in Exhibit Number 3 with the start date of</p> <p>8 9-26-2017?</p> <p>9 A. They know that I'm doing this.</p> <p>10 Q. Did they know that you were doing it at the time that</p> <p>11 you were doing it?</p> <p>12 A. At this time?</p> <p>13 Q. Yes.</p> <p>14 A. Yes.</p> <p>15 Q. Did you have discussions in advance of doing that study</p> <p>16 with them?</p> <p>17 A. I actually designed this whole thing. So when they</p> <p>18 approached me and I got -- you know, I told them this</p> <p>19 is what I'm going to do, this is what I have in mind,</p> <p>20 we have all this setup in my lab and I want to do it,</p> <p>21 and I did it.</p> <p>22 Q. Did they provide to you any suggestions on how to do</p> <p>23 this study?</p> <p>24 A. They don't know nothing about this.</p> <p>25 Q. Who paid for the pilot study that's reported in Exhibit</p>	<p style="text-align: right;">Page 69</p> <p>1 Q. Is it your testimony that the costs of the pilot study</p> <p>2 are included in what's listed in Exhibit Number 5?</p> <p>3 MS. O'DELL: Object to the form.</p> <p>4 THE WITNESS: We started the -- culturing the</p> <p>5 cells, so the idea -- are you talking about the actual</p> <p>6 money? We started -- yes, it is included there.</p> <p>7 BY MR. HEGARTY:</p> <p>8 Q. You shook your head. I want to make sure I got it on</p> <p>9 the record.</p> <p>10 A. Yes.</p> <p>11 Q. So the costs for the pilot study in Exhibit Number 3</p> <p>12 that began on September 26, 2017, are contained in</p> <p>13 Exhibit Number 5?</p> <p>14 A. Correct. It takes three weeks to get the cells up and</p> <p>15 going.</p> <p>16 MR. HEGARTY: Want to take a break? We've</p> <p>17 been going for about an hour and 20 minutes. Take a</p> <p>18 break.</p> <p>19 THE VIDEOGRAPHER: Going off the record at</p> <p>20 10:32 a.m.</p> <p>21 (A short recess was taken.)</p> <p>22 THE VIDEOGRAPHER: We're back on the record</p> <p>23 at 10:51 a.m.</p> <p>24 BY MR. HEGARTY:</p> <p>25 Q. Dr. Saed, when we left off, we were talking about any</p>

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<p>1 communication you had with Beasley Allen or other 2 attorneys for the plaintiffs with regard to the 3 experiments that you did or the preparation of the 4 manuscript that you've submitted to Reproductive 5 Sciences. Over the course of the time that you did the 6 experiments, that you did the writing, that you 7 submitted to Reproductive Sciences, OB-GYN Oncology, 8 did you exchange any e-mails or letters with attorneys 9 for Beasley Allen or the plaintiffs with regard to the 10 testing, the writing, the submission of the manuscript? 11 MS. O'DELL: Objection to form. 12 THE WITNESS: Can you please repeat the 13 question, clarify what you -- 14 BY MR. HEGARTY: 15 Q. Sure. Well, during the time that you were doing the 16 testing that we've been talking about? 17 A. Experiments. 18 Q. -- that's reflected in the lab notebooks, you call them 19 experiments, in the time that you wrote the paper that 20 you first submitted to OB-GYN Oncology and then later 21 to Reproductive Sciences. Did you have communications 22 with attorneys for Beasley Allen or any plaintiff in 23 this litigation regarding the experiments or regarding 24 the writing of the article or regarding the submission 25 of the article to journals?</p>	<p>1 the manuscript, the submission of the manuscript; is 2 that correct? 3 MS. O'DELL: Object to the form. 4 BY MR. HEGARTY: 5 Q. You can answer. 6 A. I said -- I answered you. I said I did not discuss the 7 design of the experiments, the results of the 8 experiments, where to submit it, how to analyze the 9 data, all this work I did myself. 10 Q. Understood. I'm not asking if they provided input on 11 how to do it or how to write it or where to send it. 12 I'm asking if you had discussions with any attorney for 13 Beasley Allen or any other attorney for Plaintiff over 14 the course of doing all this work about what you were 15 doing? 16 A. I still don't understand discussion, what does the 17 discussion mean? 18 Q. Well, discussion means a phone call, an in-person 19 meeting, an e-mail? 20 A. Oh. 21 Q. Any communication that talks about what you're doing. 22 MS. O'DELL: Excuse me, you may answer the 23 question whether calls or meetings occurred, you may 24 answer that yes or no, but you cannot divulge the 25 discussions or the topics that were included in those</p>
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<p>1 A. No. 2 Q. Did you have any telephone calls or meetings during 3 the -- about the experiments or the writing of the 4 manuscript for the journals or the submission of the 5 journals with attorneys for Beasley Allen or any 6 plaintiff in this litigation? 7 MS. O'DELL: Objection to the form. 8 THE WITNESS: No. 9 MS. O'DELL: I was just going to instruct you 10 to the degree that you're asking him about subjects 11 that were discussed in meetings with attorneys for the 12 plaintiff, don't discuss those, the subject matter 13 because those, they're not entitled to know those 14 discussions, so to the degree you can answer your 15 questions outside those parameters, you may. 16 THE WITNESS: My answer was no for any 17 discussion related to the design of the experiments, 18 the results of the work, the submission to the journal, 19 which journal to submit to, writing the manuscript, all 20 that work I know the answer was no to that work. 21 BY MR. HEGARTY: 22 Q. So as to everything you just described, you had no 23 discussions with the attorneys for Beasley Allen or any 24 plaintiffs in this case about anything dealing with 25 experiments, the design, the protocol the writing of</p>	<p>1 discussions. 2 THE WITNESS: Yes, so calls, we did calls. 3 BY MR. HEGARTY: 4 Q. And what were the -- what did you discuss with the 5 attorneys for Beasley Allen or the plaintiffs during 6 those calls with regard to the experiments you were 7 doing or the writing of the manuscript or the 8 submission of the journal? 9 MS. O'DELL: I'm going to instruct you not to 10 answer that question. 11 MR. HEGARTY: We object to that instruction 12 and believe that that is an inappropriate objection and 13 instruction that's not covered by the consultant 14 privilege, but we're not going to decide it here, 15 understand that, but I just want to make it clear on 16 the record that we don't agree that your objection 17 covers the kind of communications that I asked the 18 doctor. 19 MS. O'DELL: Well, the privilege covers 20 communications, whether written or verbal, in person or 21 on the telephone, during Dr. Saed's consulting 22 relationship with the plaintiffs and that's what you've 23 asked him and that's what I'm objecting to. 24 MR. HEGARTY: I understand the objection. We 25 don't agree with the objection.</p>

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<p>1 MS. O'DELL: I want to make sure the record 2 is clear. 3 MR. HEGARTY: And I'm making for the record 4 that we don't agree with the objection and dispute the 5 propriety of it and object to you instructing the 6 doctor not to respond. With regard to this -- the work 7 we've been talking about, the pilot study with talc, 8 that's reflected in the -- and the other studies with 9 talc that's reflected in the two notebooks, have you 10 prepared any other manuscripts related to those 11 experiments that you intend to submit to any journal? 12 THE WITNESS: Other than submitted abstracts 13 to different meetings, no. 14 BY MR. HEGARTY: 15 Q. Have you prepared abstracts or do you intend to prepare 16 abstracts or have you submitted abstracts regarding the 17 work reflected in the two notebooks that have not yet 18 been disseminated? 19 A. Disseminated means -- 20 MS. O'DELL: Object to form. 21 BY MR. HEGARTY: 22 Q. Well, as we're going to look at here today, there are 23 some abstracts where you describe the work that you're 24 doing, the experiments that you did. Do you currently 25 have in the works any abstracts that have not yet been</p>	<p>1 MS. O'DELL: This is not your updated CV 2 actually, this is the one -- 3 THE WITNESS: I can find it for you. It's an 4 obstetrics and gynecology online, open access online. 5 BY MR. HEGARTY: 6 Q. Who within -- for that publication asked you to write 7 an editorial? 8 A. The editorial office. 9 Q. And when did that request come in? 10 A. I think two weeks ago. 11 Q. And editorial on what? 12 A. On talc and oxidative stress. 13 Q. Have you started writing it? 14 A. Not yet. 15 Q. Do you intend to do so? 16 A. Yes. 17 Q. Did they give you a date -- 18 A. No. 19 Q. -- for submission? 20 MS. O'DELL: Let him finish his question, 21 please, Doctor. 22 BY MR. HEGARTY: 23 Q. Did they give you a date for providing -- did they give 24 you a date for providing the editorial? 25 A. No.</p>
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<p>1 published or provided to anyone? 2 MS. O'DELL: Object to the form. 3 BY MR. HEGARTY: 4 Q. Do you understand the question? 5 A. Not really. 6 Q. Well, do you currently have any abstracts that you're 7 working on that you intend to submit? 8 A. Now I understood. In relation to -- 9 Q. The experiments -- 10 A. In relation to the talc project? 11 Q. Correct. 12 A. The answer is no. 13 Q. Do you have any other written work in process relating 14 to the talc experiments that you intend to either turn 15 into an abstract or turn into a journal article? 16 A. I was asked to write an editorial to one of the 17 journals and I am planning to do that. 18 Q. Who asked you to write an editorial to a journal? 19 A. The journal. 20 Q. What journal? 21 A. OB-GYN, let me see, I can find the exact name for you, 22 which I'm planning to do. It's an open access journal 23 obstetrics and gynecology it's in my CV somewhere -- 24 trying to find it for you -- where is it -- this is my 25 updated CV?</p>	<p>1 Q. Is the editorial going to be in response to a journal 2 article or another publication? 3 A. It is in response to the published abstracts that I did 4 online. 5 Q. And with regard to the open access publication, is that 6 a publication that's only available on the internet? 7 A. Open access, yes. 8 Q. Is that a publication which you have to pay to have 9 your materials published on the internet? 10 A. All open access journals you have to pay, yes. 11 Q. You will have to pay to have your editorial published? 12 A. Yes. 13 Q. How much does that cost? 14 A. Not too much like, 3, \$400. 15 MR. LOCKE: Could we ask the witness to speak 16 up. 17 MS. O'DELL: They don't have access to a 18 speaker, so they're just listening to you over there, 19 so if you could raise your voice. 20 THE WITNESS: 4, \$500, 400 to 500 -- where is 21 that -- 22 MS. O'DELL: That's okay. 23 MR. HEGARTY: We're past that question, 24 Doctor. 25 THE WITNESS: Thank you.</p>

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<p>1 BY MR. HEGARTY:</p> <p>2 Q. We were provided some additional materials this morning</p> <p>3 that I wanted to make sure I mark for the record and</p> <p>4 follow up on a few things in those materials. I'm</p> <p>5 going to mark as Exhibit Number 10 what was represented</p> <p>6 to us today to be the index for the lab notebook that</p> <p>7 we marked as Exhibit Number 2, that's the notebook that</p> <p>8 has the experiments in it that went into your</p> <p>9 manuscript.</p> <p>10 SAED DEPOSITION EXHIBIT NUMBER 10,</p> <p>11 INDEX FOR LAB NOTEBOOK,</p> <p>12 WAS MARKED BY THE REPORTER</p> <p>13 FOR IDENTIFICATION</p> <p>14 BY MR. HEGARTY:</p> <p>15 Q. And I'll show you -- make sure we have the right lab</p> <p>16 note --</p> <p>17 MR. LAPINSKI: Counsel, is there an Exhibit 9</p> <p>18 marked?</p> <p>19 MR. HEGARTY: Oh, I skipped over Exhibit 9.</p> <p>20 I'll go back to it.</p> <p>21 THE WITNESS: So this and this.</p> <p>22 BY MR. HEGARTY:</p> <p>23 Q. Yes, you looked at Exhibit 2 compared to Exhibit 10.</p> <p>24 Is that the index to Exhibit 2?</p> <p>25 A. Yes.</p>	<p>1 A. That's the answer.</p> <p>2 Q. Let me look at the notebook. There are pages --</p> <p>3 there's 21 and then there is a 22, 23, and a 24 that's</p> <p>4 not referenced in the index. Why is that?</p> <p>5 A. Because those are figures. They could be referenced.</p> <p>6 Q. But they have page numbers on them.</p> <p>7 A. Sure.</p> <p>8 Q. And you otherwise list page numbers here that are also</p> <p>9 just pages that contained figures, correct?</p> <p>10 A. Correct.</p> <p>11 Q. Why are these pages not referenced in the index?</p> <p>12 A. I don't know.</p> <p>13 Q. There are also --</p> <p>14 A. Maybe --</p> <p>15 Q. I'm sorry.</p> <p>16 A. Maybe -- we have it, we labeled it.</p> <p>17 Q. But they're not included in the index.</p> <p>18 A. Maybe just missed here.</p> <p>19 Q. There are also a number of pages that have been cut out</p> <p>20 of Exhibit Number 2 that -- where the pages go from 24</p> <p>21 to 29, and there are clearly pages in between that</p> <p>22 appear to have either been cut out by a razor or by</p> <p>23 some other cutting instrument. First of all, what was</p> <p>24 on those pages?</p> <p>25 A. Okay, so as I mentioned earlier, we do not specify one</p>
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<p>1 Q. With regard to the index there, on the index, Doctor,</p> <p>2 Exhibit 10, the pages after 21 you jump to 31. What</p> <p>3 happened to Pages 22 to 29 -- I'm sorry, 22 to 30?</p> <p>4 MS. O'DELL: I'm sorry, are you referring to</p> <p>5 Exhibit 10 or --</p> <p>6 MR. HEGARTY: Yes, Exhibit 10, the pages go</p> <p>7 20-21, then jump to 31-32, and my question is where are</p> <p>8 Pages 22 to 30?</p> <p>9 THE WITNESS: 22, you said?</p> <p>10 BY MR. HEGARTY:</p> <p>11 Q. Yes.</p> <p>12 A. 22, 23, 24, 29. Oh, so there's -- yeah, you talking</p> <p>13 about the tore apart?</p> <p>14 Q. We'll get to that part in a second. First of all, why</p> <p>15 aren't Pages 22 to 29 listed in the index or at least a</p> <p>16 portion of those?</p> <p>17 MS. O'DELL: Object to the form.</p> <p>18 THE WITNESS: 31 -- 21 -- 21, 31, what</p> <p>19 happened, 21, yeah, there is nothing after that, right?</p> <p>20 BY MR. HEGARTY:</p> <p>21 Q. Well, on Exhibit Number 10 it jumps from 21 to 31, and</p> <p>22 where are the nine or ten pages in between those?</p> <p>23 A. Yeah, that's what I'm talking about, those are -- you</p> <p>24 want me to answer for the missing pages?</p> <p>25 Q. Well, I'll get to that first but --</p>	<p>1 lab notebook to a specific study. So my research</p> <p>2 technician by a mistake added a different project here,</p> <p>3 and because this is talc, there is a litigation and</p> <p>4 lawyers and all that, we had to remove it and we have</p> <p>5 to specialize in that lab notebook just for this work.</p> <p>6 Q. What other project was represented or documented in</p> <p>7 those pages that were removed from this lab notebook?</p> <p>8 A. It's a different project than talc.</p> <p>9 Q. What was the project or what is the project?</p> <p>10 MS. O'DELL: You mean the subject matter?</p> <p>11 BY MR. HEGARTY:</p> <p>12 Q. The subject matter.</p> <p>13 A. The same, reactive oxygen species, inflammation in</p> <p>14 ovarian cancer.</p> <p>15 Q. What are you looking at in that other project?</p> <p>16 A. I can't remember, but I can find out.</p> <p>17 Q. Does it involve exposure to any environmental</p> <p>18 particulate?</p> <p>19 A. No.</p> <p>20 Q. Do you know when the pages that we've been talking</p> <p>21 about were removed from this lab notebook?</p> <p>22 A. I don't remember.</p> <p>23 Q. Were you aware that they had been removed?</p> <p>24 A. Yes.</p> <p>25 Q. Have you ever in your experiences in conducting a lab</p>

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<p>1 cut out pages of a lab notebook?</p> <p>2 A. Have I ever done that? No.</p> <p>3 Q. That's not good laboratory practice, is it?</p> <p>4 MS. O'DELL: Objection to form.</p> <p>5 THE WITNESS: Yes, I -- the reason I told</p> <p>6 you, I just told you the reason why we did that.</p> <p>7 BY MR. HEGARTY:</p> <p>8 Q. But my question is that's not proper laboratory</p> <p>9 practice to cut out pages of a lab book, is it?</p> <p>10 MS. O'DELL: Object to the form.</p> <p>11 THE WITNESS: We didn't cut the notes from</p> <p>12 them, we just wanted to keep the talc study separate.</p> <p>13 BY MR. HEGARTY:</p> <p>14 Q. Understood, but I'm talking about good laboratory</p> <p>15 practices, and good laboratory practices don't sanction</p> <p>16 or allow for you to cut out pages of a laboratory</p> <p>17 notebook, do they?</p> <p>18 MS. O'DELL: Object to the form.</p> <p>19 THE WITNESS: We, as you can see, we're not</p> <p>20 hiding it.</p> <p>21 BY MR. HEGARTY:</p> <p>22 Q. I'm not asking if you're hiding it. I'm asking you, do</p> <p>23 you -- is it your testimony that cutting lab -- cutting</p> <p>24 pages out of a lab notebook is consistent with good</p> <p>25 laboratory practice?</p>	<p>1 Q. And Nicole King again is who?</p> <p>2 A. My research post doc.</p> <p>3 Q. Then on the other lab notebook that contained -- that</p> <p>4 was on Exhibit 2. Exhibit 3 on the outside is</p> <p>5 something called Temple 1. What does that mean?</p> <p>6 A. That's a project that we did for Temple Pharmaceutical</p> <p>7 in our lab.</p> <p>8 Q. That's a project that's -- that's the project that's in</p> <p>9 the first part of the lab notebook?</p> <p>10 A. Correct.</p> <p>11 SAED DEPOSITION EXHIBIT NUMBER 9,</p> <p>12 PILOT STUDY,</p> <p>13 WAS MARKED BY THE REPORTER</p> <p>14 FOR IDENTIFICATION</p> <p>15 BY MR. HEGARTY:</p> <p>16 Q. Also provided today, which I'll mark as Exhibit</p> <p>17 Number 9, are copies of what I believe to be the pilot</p> <p>18 study that's contained in Exhibit Number 3. Would you</p> <p>19 look at Exhibit Number 9 and compare to Exhibit</p> <p>20 Number 3, and tell me whether Exhibit Number 9 are the</p> <p>21 pages copied from Exhibit Number 3, the pilot project</p> <p>22 we talked about earlier along with the index?</p> <p>23 A. Yes.</p> <p>24 Q. On the first page of -- or strike that. On Page 1 of</p> <p>25 Exhibit Number 2 there's a statement at the very</p>
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<p>1 MS. O'DELL: Object to the form.</p> <p>2 THE WITNESS: I didn't say that.</p> <p>3 BY MR. HEGARTY:</p> <p>4 Q. You agree it's not consistent with good laboratory</p> <p>5 practice, don't you?</p> <p>6 MS. O'DELL: Object to the form.</p> <p>7 THE WITNESS: I don't agree.</p> <p>8 BY MR. HEGARTY:</p> <p>9 Q. You don't agree with what?</p> <p>10 A. Okay, I told you the reason why we removed those pages.</p> <p>11 Q. Did you instruct someone to cut those pages out of this</p> <p>12 notebook?</p> <p>13 A. My lab research assistant was doing different project.</p> <p>14 She was writing it here in the middle of this lab</p> <p>15 notebook. I asked her let's remove it, continue so we</p> <p>16 can keep this lab notebook independent.</p> <p>17 Q. But the other lab notebook you prepared you left in the</p> <p>18 pages of the other project, you didn't cut those out,</p> <p>19 correct?</p> <p>20 A. No, because this was a preliminary results and that was</p> <p>21 continued, not in the middle, it was continued, so we</p> <p>22 only used like few pages from the book.</p> <p>23 Q. The lab notebooks contain on the outside, at least one</p> <p>24 of them, Nicole King Talc Study, do you see that?</p> <p>25 A. I do.</p>	<p>1 beginning that says tried to dissolve talc Fisher 74 --</p> <p>2 or Fisher T4-500 lot numbers 166820 in Johnson &</p> <p>3 Johnson Baby Powder. Do you see that reference? Do</p> <p>4 you see where I'm reading?</p> <p>5 A. You're reading wrong. What is in?</p> <p>6 Q. In.</p> <p>7 A. That's not in.</p> <p>8 Q. What is that word?</p> <p>9 A. That's or.</p> <p>10 Q. Or Johnson's Baby Powder, okay, and it says it won't</p> <p>11 completely dissolve. What does that mean?</p> <p>12 A. It won't completely dissolve.</p> <p>13 Q. What was the extent of its -- that it dissolved?</p> <p>14 A. Partial.</p> <p>15 MS. O'DELL: Object to form.</p> <p>16 THE WITNESS: Yeah, so, okay, so you need to</p> <p>17 know the percentage of how much it's dissolved?</p> <p>18 BY MR. HEGARTY:</p> <p>19 Q. How much is dissolved as reflected in Page 1.</p> <p>20 A. Nothing dissolved.</p> <p>21 Q. Whose handwriting is on Page 1?</p> <p>22 A. This is Nicole I think, I think.</p> <p>23 Q. Whose handwriting is throughout Exhibit Number 2?</p> <p>24 A. This?</p> <p>25 Q. Throughout the exhibit.</p>

22 (Pages 82 to 85)

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<p style="text-align: right;">Page 86</p> <p>1 A. Some Nicole, some others, my research assistant.</p> <p>2 Q. Who else's handwriting besides Nicole's are in Exhibit</p> <p>3 Number 2?</p> <p>4 A. My research assistant.</p> <p>5 Q. Who is that?</p> <p>6 A. Flory, her name is Flory, Flory Rong, I think she's</p> <p>7 part of the authors, yes, her name is, okay, this is</p> <p>8 the right -- correction, Fan Rong.</p> <p>9 MS. O'DELL: How do you spell that?</p> <p>10 THE WITNESS: It's here, F-a-n and then</p> <p>11 R-o-n-g.</p> <p>12 BY MR. HEGARTY:</p> <p>13 Q. Isn't it Rong Fan, Doctor?</p> <p>14 A. Rong Fan? The first name is --</p> <p>15 Q. First name is Rong, right?</p> <p>16 A. I think it's the other way around, I'm not expert on</p> <p>17 names.</p> <p>18 Q. Who is Mr. Rong?</p> <p>19 A. Mrs.</p> <p>20 Q. Mrs. Rong who is that?</p> <p>21 A. She is my research assistant.</p> <p>22 Q. How long has she been your research assistant?</p> <p>23 A. From I believe the beginning of '18.</p> <p>24 Q. But you don't know her name?</p> <p>25 A. I know her name, Flory, we call her Flory.</p>	<p style="text-align: right;">Page 88</p> <p>1 Q. Does that mean there could be instances where work was</p> <p>2 done on that date but then entered later in the lab</p> <p>3 notebook?</p> <p>4 A. Okay, so let me explain how we do this. So we run our</p> <p>5 experiments and we have everything, as you see here,</p> <p>6 electronically, and we -- it's a matter of -- practice</p> <p>7 of cutting and pasting it in the lab notebook, but</p> <p>8 everything is done in electronically.</p> <p>9 Q. When was this lab notebook, Exhibit Number 2, prepared?</p> <p>10 A. I don't know, exact dates?</p> <p>11 Q. Correct.</p> <p>12 A. I don't know, I can't remember.</p> <p>13 Q. Well, the date -- the dates run from 10-15-17 to --</p> <p>14 A. All the way to --</p> <p>15 Q. All the way to --</p> <p>16 A. -- October.</p> <p>17 Q. -- October or so of 2018. So was this notebook</p> <p>18 prepared over that entire period of time?</p> <p>19 A. Yes.</p> <p>20 Q. It wasn't prepared, put together in its entirety four</p> <p>21 weeks ago?</p> <p>22 A. Some of it was, yes.</p> <p>23 Q. What portions were put together four weeks ago?</p> <p>24 A. I think the one related to the last portion.</p> <p>25 Q. Can you point to me the pages that were put together in</p>
<p style="text-align: right;">Page 87</p> <p>1 Q. What's her full name?</p> <p>2 A. This is her full name, how she officially write, it's</p> <p>3 on the paper.</p> <p>4 Q. And is it -- according to you, is her name Fan Rong?</p> <p>5 A. I call her Flory.</p> <p>6 Q. Do you know her name?</p> <p>7 A. That's her name.</p> <p>8 Q. And how do you pronounce it?</p> <p>9 A. Rong Fan, I never called her with this name.</p> <p>10 Q. Who else's handwriting is contained in Exhibit</p> <p>11 Number 2?</p> <p>12 A. Some would be mine.</p> <p>13 Q. Who else?</p> <p>14 A. That's it.</p> <p>15 Q. Were all the entries in Exhibit Number 2 prepared at</p> <p>16 the time that the work was done?</p> <p>17 A. No.</p> <p>18 Q. When you say no, does that mean that there was work</p> <p>19 done and then the -- later on entries were made in the</p> <p>20 lab notebook?</p> <p>21 A. Correct.</p> <p>22 Q. How much later -- strike that. If the entries have a</p> <p>23 certain date on them, does that mean that they were</p> <p>24 entered on that date or the work was done on that date?</p> <p>25 A. Work was done on that date.</p>	<p style="text-align: right;">Page 89</p> <p>1 the last month or so?</p> <p>2 A. I can't really exactly remember, but the last, I would</p> <p>3 say, the statistical part for sure.</p> <p>4 Q. Starting on what page?</p> <p>5 A. I'm trying to find it. So starting on Page 114, this</p> <p>6 is the statistics of the study, all the way to 19 --</p> <p>7 122, 124, so all the way to the end, which is 124.</p> <p>8 This part, it's created by or done by a</p> <p>9 biostatistician, and this is all you can see</p> <p>10 electronics, so we just cut and pasted there.</p> <p>11 Q. So if you go to Page 114, that has a date of October 6,</p> <p>12 2018. Is it your testimony that this was not prepared</p> <p>13 on that date but was prepared later and then back dated</p> <p>14 to say October 6, 2018?</p> <p>15 MS. O'DELL: Object to the form, misstates</p> <p>16 his testimony.</p> <p>17 BY MR. HEGARTY:</p> <p>18 Q. You can answer.</p> <p>19 MS. O'DELL: If you understand the question.</p> <p>20 THE WITNESS: What's the question?</p> <p>21 BY MR. HEGARTY:</p> <p>22 Q. Sure. You see the date at the top of that page of</p> <p>23 October 6, 2018, correct?</p> <p>24 A. Correct.</p> <p>25 Q. Was this page prepared on that date or was it prepared</p>

23 (Pages 86 to 89)

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<p>1 at a time later than that but dated October 6, 2018?</p> <p>2 MS. O'DELL: Object to the form.</p> <p>3 THE WITNESS: Okay, so this -- I can't</p> <p>4 remember when we did the statistics, but this date</p> <p>5 reflects when the statistics was actually done.</p> <p>6 BY MR. HEGARTY:</p> <p>7 Q. So in this instance, the statistics were done on</p> <p>8 October 6, 2018, but was the page prepared later than</p> <p>9 that after October 6, 2018?</p> <p>10 A. The pages, yes.</p> <p>11 Q. With regard to other entries in the notebook that have</p> <p>12 dates, can you tell whether those pages were created on</p> <p>13 the date listed on the page or were they created later</p> <p>14 but backdated to the date the work occurred?</p> <p>15 MS. O'DELL: Objection to form.</p> <p>16 THE WITNESS: Yeah, so, again, we do the</p> <p>17 experiment, sometimes it takes a week or two to write</p> <p>18 it in the notebook because we have the data</p> <p>19 electronically, so I cannot tell you the exact date</p> <p>20 when they were put in.</p> <p>21 BY MR. HEGARTY:</p> <p>22 Q. All the data that is reflected in Exhibit Number 2 is</p> <p>23 kept in electronic format?</p> <p>24 A. Yes.</p> <p>25 Q. Does that electronic format still exist?</p>	<p>1 January 2018, and I'll direct you to Page --</p> <p>2 A. 51.</p> <p>3 Q. Page 53.</p> <p>4 A. Of this notebook?</p> <p>5 Q. Of the notebook.</p> <p>6 A. So one more time, the question.</p> <p>7 Q. Turn to Page 53 of Exhibit Number 2.</p> <p>8 A. 53?</p> <p>9 Q. Yes.</p> <p>10 A. Okay.</p> <p>11 Q. There's a couple dates at the top of January 3rd, 2018</p> <p>12 and, also, do you see January 7, 2018 at the top?</p> <p>13 MS. O'DELL: Excuse me, Mark, what Bates</p> <p>14 Number?</p> <p>15 MR. HEGARTY: I'm looking at -- I'm using the</p> <p>16 page numbers in the lower right-hand corner.</p> <p>17 THE WITNESS: 53?</p> <p>18 BY MR. HEGARTY:</p> <p>19 Q. 53.</p> <p>20 A. On this date?</p> <p>21 Q. Yes, 1-7-18. What I'm trying to find out is when was</p> <p>22 the first date that you did --</p> <p>23 MS. O'DELL: What's the Bates Number on the</p> <p>24 document?</p> <p>25 MR. HEGARTY: The Bates Number is 25.</p>
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<p>1 A. Yes.</p> <p>2 Q. Is the data in that electronic format all dated and is</p> <p>3 the date the date the data was generated?</p> <p>4 MS. O'DELL: Objection to form.</p> <p>5 BY MR. HEGARTY:</p> <p>6 Q. You're pointing to an example.</p> <p>7 A. An example.</p> <p>8 Q. What page is that on?</p> <p>9 A. June 19.</p> <p>10 Q. What page is that on, Doctor?</p> <p>11 A. This is Page -- oh, no, that's -- which page was</p> <p>12 this --</p> <p>13 Q. It's in the lower right-hand corner.</p> <p>14 A. I just noticed -- no, it's this one. Like, for</p> <p>15 example, if you find the dates that are here, these</p> <p>16 dates reflect the time we did the experiment.</p> <p>17 Q. Can you stop at a page and give me an example?</p> <p>18 A. I'm trying to find one. So this is February --</p> <p>19 Page 73, if you look here, it says February -- so</p> <p>20 small, February 20th, is that --</p> <p>21 Q. Yes, 2018.</p> <p>22 A. Right. So that's the date, and that's the date that is</p> <p>23 this experiment performed.</p> <p>24 Q. With regard to the experiments that you did for your</p> <p>25 manuscript, did those experiments begin in</p>	<p>1 MS. O'DELL: Okay.</p> <p>2 BY MR. HEGARTY:</p> <p>3 Q. When is the first date that you started the -- when did</p> <p>4 you start the experiments that you then report in your</p> <p>5 manuscript?</p> <p>6 A. It says right there, January 3rd we seeded the cells,</p> <p>7 started the experiment.</p> <p>8 Q. If you go to Page 2 using the Bates -- let me switch</p> <p>9 you over to the Bates Numbers because that's what I had</p> <p>10 to work from.</p> <p>11 A. Okay.</p> <p>12 Q. Let me show you Exhibit Number 1, that's a copy of the</p> <p>13 notebook that we've been looking at, Exhibit Number 2.</p> <p>14 A. Okay. Page 2?</p> <p>15 Q. Look at Page 2 of Bates Number --</p> <p>16 MS. O'DELL: When he says Bates Number, he's</p> <p>17 referring to the very small number to the right-hand</p> <p>18 side that's been -- yes --</p> <p>19 THE WITNESS: Where does it say Page 2? Oh,</p> <p>20 sorry, okay. Page 2?</p> <p>21 BY MR. HEGARTY:</p> <p>22 Q. Yes, and that has a date of January 24, 2018?</p> <p>23 A. Yes.</p> <p>24 Q. Do you see that?</p> <p>25 A. Yes.</p>

24 (Pages 90 to 93)

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<p>1 Q. Then if you go through the next several pages through 2 to Page 23 by Bates Number -- 3 A. Yes. 4 Q. -- that's dated March 2nd, 2018. Do you see that? 5 A. Yes. 6 Q. Then if you go to Page 25, I'm sorry, if you go to 7 Page 53 -- 8 A. It's January 7. 9 Q. Well, then you go Page 25 you see January 7, which is 10 not in the same order. So the book doesn't appear to 11 be in chronologic order, is that correct? 12 A. Okay, let me answer this. Here is the answer. So we 13 have sections, this is a PCR section, we left some 14 pages blank, next section is ELISA section, because 15 we're doing the experiments simultaneously, so we 16 wanted to separate each section, so the PCR section we 17 created, we designated certain pages, and then we have 18 ELISA section, and then we have other sections. So 19 every time we do the experiment, we add to the section. 20 That's why the dates are not in chronological order. 21 Q. Okay. If you look at Bates Number 78, Doctor, that 22 page is dated June 29, 2018? 23 A. This one? 24 Q. Yes. 25 A. Yes.</p>	<p>1 BY MR. HEGARTY: 2 Q. Sure. As we just looked at, the graphs are all -- and 3 tables and charts are all dated, correct? 4 A. Correct. 5 Q. Were they added to the notebook at the time they were 6 created or were they added later? 7 A. Which graph you referring to? 8 Q. Any of the tables where the -- that have been pasted 9 in, were they pasted in at the time they were created 10 or later? 11 MS. O'DELL: Object to the form, asked and 12 answered. 13 THE WITNESS: So you are saying if this graph 14 was created the same time that -- 15 BY MR. HEGARTY: 16 Q. We're looking at Page 87, and you're pointing to a 17 graph, and my question is with regard to the graph, was 18 it pasted in the notebook on the day it was generated? 19 MS. O'DELL: Objection, asked and answered. 20 THE WITNESS: I really can't remember, but we 21 have this electronically. 22 BY MR. HEGARTY: 23 Q. Doctor, if you go to Page 4, Bates Number 4, which 24 corresponds to Page 33 of the notebook -- 25 A. This?</p>
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<p>1 Q. See that date? 2 A. I imagine it better if I see the notebook. 3 Q. Then if you turn over to Bates 86. 4 A. 86. 86 that's a different section. 5 Q. Okay. There's a date on there of September 4, 2018, 6 looked like there was a break between June 29th and 7 September 4. 8 A. Look at the original here, see that's a section, it's a 9 different section. 10 Q. To the extent that there are periods of time where 11 there is no activity going on, that there might be a 12 month between data entries, does that mean that there's 13 no work going on at that time? 14 A. No, no, no, we do simultaneously different, like we do 15 PCR, we do ELISA, we do proliferation, all that 16 studies, and we divided this notebook into sections, 17 and as we go, we added to the corresponding section, so 18 you can -- yeah. 19 Q. And were all the graphs in the notebook provided at a 20 later time or were they provided at the time they were 21 created? 22 MS. O'DELL: Objection to form. 23 THE WITNESS: Yeah, I don't really understand 24 the question. 25</p>	<p>1 Q. -- there appears to be a reference on Page 33 that 2 says go to Page 35. Do you see that? 3 A. Okay. 4 Q. How can you know to go to Page 35 when you're on 5 Page 33 and 35 is not yet created? 6 A. Oh, okay, good question. So this is established 7 protocol, we do this -- this is not like the first time 8 we're doing this, this is done repeatedly over years 9 and years and years with different publication. This 10 is the setup how we write it, so this is like something 11 we predicting to happen, this we already know, that's 12 the protocol, we just sticking it here. 13 Q. You're anticipating that when you prepare -- strike 14 that. When you prepared Page 33, you're anticipating 15 that you were going to -- 16 A. Discuss it. 17 Q. -- discuss it in Page 35? 18 A. Yes. 19 Q. Are the page numbers that you've added at the bottom in 20 handwriting, are those made in the beginning of the 21 work or are they added as you go? In other words, do 22 you start with a notebook that's blank and then just 23 simply number the pages before you start the work or 24 you do it after the fact? 25 A. We do it both ways, I don't remember.</p>

25 (Pages 94 to 97)

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<p>1 Q. There's -- the writing I pointed to is in blue ink 2 versus the other writing, which is in black ink. Was 3 that blue ink added at the time that 33 was created or 4 was it added later? 5 A. I don't remember. 6 Q. Do you know whose handwriting -- 7 A. Yeah, this is Rong -- what's her name, Mrs. Rong. 8 Q. Okay. If you look again back at Page 4 of the Bates 9 Stamped copy. 10 A. Page 4. 11 Q. That's Exhibit Number 1. 12 A. Same page, 4? That's 4. 13 Q. Same Page 4, which is Page 33 of the lab notebook, 14 okay? 15 A. Same page. 16 Q. There is a portion of that notebook page that is whited 17 out, correct, and written over? 18 A. Yeah, I see that. 19 Q. What was whited out? 20 A. (Shrugs shoulders.) 21 Q. Do you know? 22 A. I don't know. Again, this is an established procedure 23 that had been published with several, 100 papers over. 24 Q. Well, what established procedure can you cite me to 25 that says that it's proper laboratory practice to white</p>	<p>1 BY MR. HEGARTY: 2 Q. That's not proper laboratory practice, is it? 3 A. No. What I said is really simple. She probably did a 4 mistake and then she whited out and wrote over it. 5 Q. Proper laboratory practice is to line through it so the 6 information that was there is still visible, and then 7 include the data somewhere else so everything is 8 transparent, correct? 9 MS. O'DELL: Object to the form. 10 THE WITNESS: The information that she whited 11 out has nothing to do with the results or anything. 12 This is just describing an established methodology that 13 is published in all of our papers. 14 MR. KLATT: Objection, form, unresponsive. 15 MR. HEGARTY: Understood, but the proper 16 laboratory practice would be to line through it so it 17 could still be visible, and then add the corrected or 18 additional information, correct? 19 MS. O'DELL: Object to the form. 20 THE WITNESS: My response, as I told you, 21 this is something that she probably misspelled or 22 mistake she did, she thought she was doing something, 23 writing something, she wrote different, you know, we're 24 doing different experiment different time, same times. 25 MR. KLATT: Objection, form, nonresponsive.</p>
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<p>1 out information and then write over it? 2 MS. O'DELL: Object to the form. 3 THE WITNESS: If you like write something 4 like a mistake or a typo and you write it over. 5 BY MR. HEGARTY: 6 Q. Can you cite for me any -- 7 A. Cite? 8 Q. -- published guidelines or laboratory methods that say 9 that that's a proper approach to preparing a lab 10 notebook? 11 MS. O'DELL: Objection to form. 12 THE WITNESS: Yeah, umm, what we did here I 13 think -- this is her handwriting and -- 14 MS. O'DELL: When you say "her," who are you 15 referring to? 16 THE WITNESS: Rong, Mrs. Rong, so nothing 17 really that alarmed me or directed my attention to 18 anything. She wrote what she supposed to write. Maybe 19 she did a mistake. 20 BY MR. HEGARTY: 21 Q. Doctor, would you ever in preparing a lab notebook 22 white out information that's been written in a lab 23 notebook and then write over it? 24 MS. O'DELL: Object to the form. 25 THE WITNESS: Typically I don't do that, no.</p>	<p>1 BY MR. HEGARTY: 2 Q. Doctor, listen to my question. The proper laboratory 3 practice would be to line through what she whited over 4 so that it would still be visible, and then add 5 whatever other information she wanted to add to this 6 page, correct? 7 A. If it's related to data. 8 Q. So this is not proper, this whiting out is not proper 9 laboratory practice, correct? 10 MS. O'DELL: Let him finish his question, and 11 give me a moment to object. Object to the form. 12 You may answer if you remember his question. 13 THE WITNESS: What I am trying to tell you, 14 if it's something to do with data it is not proper to 15 do, but this is -- this even shouldn't be in the 16 notebook, we can reference that, it is something that 17 we do in our laboratory so we can be detailed, it's 18 about the procedure, the method, which is already 19 published. 20 BY MR. HEGARTY: 21 Q. But good laboratory practice -- 22 A. It has nothing to do -- 23 Q. Let me finish, Doctor -- good laboratory practice, 24 whether it's data or otherwise, dictates that you not 25 white out any information that's put in a lab notebook;</p>

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<p>1 rather, you're to line through it so it's still</p> <p>2 visible, correct?</p> <p>3 MS. O'DELL: Object to the form.</p> <p>4 THE WITNESS: I just told you what I feel.</p> <p>5 This is an established method, it's nothing to do with</p> <p>6 the data, this is just describing standard methodology,</p> <p>7 with it or without it, doesn't change anything.</p> <p>8 BY MR. HEGARTY:</p> <p>9 Q. So are you okay or fine with the whiting out of</p> <p>10 information in this lab notebook as was done here?</p> <p>11 MS. O'DELL: Objection to form.</p> <p>12 THE WITNESS: What I'm -- am I fine with</p> <p>13 that?</p> <p>14 BY MR. HEGARTY:</p> <p>15 Q. Yes.</p> <p>16 A. I prefer that does not happen, but it happened and she</p> <p>17 did it, but that doesn't change anything.</p> <p>18 Q. Above that whited out area there's an arrow pointing to</p> <p>19 100 milligrams talc, after the arrow it says Johnson</p> <p>20 Baby Powder. Do you see where I'm referring to,</p> <p>21 Doctor?</p> <p>22 A. Yes.</p> <p>23 Q. Whose handwriting is that?</p> <p>24 A. I think it's Flory.</p> <p>25 Q. Was that information added later than the time this</p>	<p>1 that. Do you see that?</p> <p>2 A. I do.</p> <p>3 Q. Whose handwriting is reflected by the addition of</p> <p>4 Johnson & Johnson, et cetera?</p> <p>5 A. I think it's Flory, Rong.</p> <p>6 Q. What was under -- what did she write over?</p> <p>7 A. I don't know, I wasn't there when she wrote this, but</p> <p>8 when I looked at it I confirmed that this is what we</p> <p>9 did.</p> <p>10 Q. Well, did she write over Fisher Scientific talc?</p> <p>11 A. Could be.</p> <p>12 Q. But did you actually test Fisher Scientific talc</p> <p>13 instead of Johnson & Johnson and then alter the lab</p> <p>14 notebook?</p> <p>15 MS. O'DELL: Objection, form.</p> <p>16 THE WITNESS: We actually did both.</p> <p>17 BY MR. HEGARTY:</p> <p>18 Q. You agree it's not proper practice, as reflected here,</p> <p>19 to white out information in a lab notebook where it</p> <p>20 can't be read and then write over it, correct?</p> <p>21 MS. O'DELL: Objection to form.</p> <p>22 THE WITNESS: You keep asking me the same</p> <p>23 question. I'm answering you the same way. She did the</p> <p>24 mistakes, to the best of her ability that's what she</p> <p>25 thought she will do, and I left it because I don't want</p>
Page 103	Page 105
<p>1 page was prepared?</p> <p>2 A. No.</p> <p>3 Q. Can you tell when that information was added to Page 33</p> <p>4 or Bates Number Page 4?</p> <p>5 MS. O'DELL: Objection to the form.</p> <p>6 THE WITNESS: When we prepared the page.</p> <p>7 BY MR. HEGARTY:</p> <p>8 Q. Why was it added in a way that put it out of order and</p> <p>9 had to have a line directing it to another part of the</p> <p>10 page?</p> <p>11 A. That's what we did.</p> <p>12 Q. Why was it not included there in the first place?</p> <p>13 MS. O'DELL: Objection, asked and answered.</p> <p>14 BY MR. HEGARTY:</p> <p>15 Q. You don't know?</p> <p>16 A. I don't know.</p> <p>17 Q. If you look next at Bates Stamp Page 25, which is</p> <p>18 Page 53 of the lab notebook, there is another portion</p> <p>19 that has been whited out and written over. Do you see</p> <p>20 that?</p> <p>21 A. Yes, I see it.</p> <p>22 Q. What was whited out?</p> <p>23 A. I don't know.</p> <p>24 Q. Something was whited out and the name Johnson & Johnson</p> <p>25 number 30027477 lot number 13717RA was written over</p>	<p>1 to change it.</p> <p>2 BY MR. HEGARTY:</p> <p>3 Q. Did you talk to her about the propriety of whiting out</p> <p>4 data?</p> <p>5 A. Yes, I did.</p> <p>6 Q. What did you tell her?</p> <p>7 A. I said we should not white out just write underneath</p> <p>8 it.</p> <p>9 Q. When did you have that discussion with her?</p> <p>10 A. After I saw this.</p> <p>11 Q. When did you see it?</p> <p>12 A. I think -- I don't remember.</p> <p>13 Q. Did you see it in the last two weeks?</p> <p>14 A. No, no, no, way before.</p> <p>15 Q. Is it proper methodology for creating -- for doing</p> <p>16 experiments and creating a lab book to white -- start</p> <p>17 over. Is it proper methodology in doing experiments</p> <p>18 like this in creating the lab book that corresponds</p> <p>19 with those experiments to white out information and</p> <p>20 then write over it?</p> <p>21 MS. O'DELL: Objection to form.</p> <p>22 BY MR. HEGARTY:</p> <p>23 Q. In your opinion?</p> <p>24 MS. O'DELL: Objection to form.</p> <p>25 THE WITNESS: So I just told you we did</p>

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<p>1 not -- with the information that is here is accurate, 2 we voluntarily did that. 3 BY MR. HEGARTY: 4 Q. I'm not asking you if the information is accurate with 5 my question. My question is, is it proper methodology 6 in doing experiments like this and in creating the lab 7 notebook that corresponds to those experiments to white 8 out information and write over it, in your opinion? 9 MS. O'DELL: Object to the form. 10 THE WITNESS: I mean it's -- in my personal 11 opinion? 12 BY MR. HEGARTY: 13 Q. Correct. 14 A. I think if you report that this is what actually 15 happened and a mistake happened and this is, to her 16 knowledge, this is the best way to handle it, she 17 handled it. 18 Q. So you consider the -- 19 A. And I talked to her about it and -- 20 Q. Do you consider the way she handled it to be proper 21 laboratory methodology? 22 A. That's why I told you, I talked to her about it so I 23 don't. 24 Q. May I see the notebook? 25 A. Sure.</p>	<p>1 MS. O'DELL: Object to form. 2 THE WITNESS: I didn't cover it, I just 3 showed it to you. 4 BY MR. HEGARTY: 5 Q. I'm talking about in the creation of a lab book, 6 though, is it considered proper methodology to take a 7 printout from a test and paste over text in the lab 8 notebook? 9 MS. O'DELL: Object to the form. 10 THE WITNESS: I just told you. So my answer 11 is the information that she decided to hide this that 12 you're talking about is an established methodology in 13 my lab that doesn't even need to be here. She chose 14 to just -- over it for a space limitation, that's all, 15 but it's not hidden, you can see it. 16 BY MR. HEGARTY: 17 Q. Thank you. 18 A. If we hide it, we can -- we don't have to have it 19 there. 20 Q. That information, though, was not photocopied and 21 provided to us in advance of the deposition, correct? 22 A. What information? 23 Q. The information that was covered by that chart. 24 MS. O'DELL: Object to the form. 25 THE WITNESS: I know, I see, there is no</p>
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<p>1 Q. Doctor, I'm looking at Page 102 of the notebook, 2 Exhibit Number 2, which is Bates 78. If you want to 3 look at it -- 4 A. Okay, yes, I see it. 5 Q. -- either in Exhibit 1 or Exhibit 2. There appears to 6 be something that has been covered over by the table 7 that's been pasted there because I see some handwriting 8 on the far right-hand column, and I don't want to pull 9 that up, but what is under that table or that chart? 10 A. The answer is I don't know. But I'll find out. It's a 11 description of the method. 12 Q. I just want to note for the record that the doctor is 13 pulling the table up and -- 14 A. Yeah. 15 Q. Okay. 16 A. Do you want to see what's written under? 17 Q. Yes. 18 A. Okay. I want to see, also. Okay. So this is just the 19 oligonucleotide primers and the cyclin for the PCR, 20 this is very standard protocol that you don't need to 21 even show, it's a methodology, so it doesn't really 22 need to even show that. 23 Q. So, in your opinion, is it proper laboratory practice 24 in creating a lab book to cover up information that's 25 included in a lab book by a table or a chart?</p>	<p>1 information covered by that chart, that is not needed 2 to be there. 3 BY MR. HEGARTY: 4 Q. But there is information that's been covered, correct? 5 MS. O'DELL: Object to the form. 6 THE WITNESS: I answered, I said there is not 7 relevant information that is covered, intentionally 8 covered. 9 BY MR. HEGARTY: 10 Q. Over on Page 103 of Exhibit Number 2, Bates Number 79, 11 there is another or other words that have been whited 12 out. What are those other words? 13 MS. O'DELL: Object to the form. 14 THE WITNESS: I mean I can read the word. 15 BY MR. HEGARTY: 16 Q. What is the word? 17 A. It says sample something. 18 Q. Why was that whited out? 19 A. Maybe it doesn't belong here. 20 Q. Do you know why it was whited out? 21 A. I think it doesn't belong here. 22 Q. Who whited it out? 23 A. Flory. 24 Q. Is that whiteout okay to you in terms of doing a 25 proper -- having a proper methodology for preparing a</p>

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<p style="text-align: right;">Page 110</p> <p>1 lab notebook?</p> <p>2 MS. O'DELL: Objection to the form.</p> <p>3 THE WITNESS: I prefer without it but it's</p> <p>4 what it is.</p> <p>5 BY MR. HEGARTY:</p> <p>6 Q. Doctor, would you look at Exhibit Number 1 at Bates</p> <p>7 Stamp 57, please.</p> <p>8 A. Exhibit Number -- this is --</p> <p>9 Q. Yes, what you have in front of you.</p> <p>10 A. 57?</p> <p>11 Q. Correct. That corresponds to Page 84 of the lab</p> <p>12 notebook. There is now in the lab notebook a table</p> <p>13 that is pasted there that appears to have been removed</p> <p>14 from the page that we received that was photocopied and</p> <p>15 is part of Exhibit Number 1. Can you explain why our</p> <p>16 copy does not include that table?</p> <p>17 MS. O'DELL: Object to the form.</p> <p>18 THE WITNESS: No idea.</p> <p>19 BY MR. HEGARTY:</p> <p>20 Q. Okay.</p> <p>21 A. But it's here.</p> <p>22 Q. Well, do you know what else --</p> <p>23 A. This is this.</p> <p>24 Q. Do you know what other charts were removed from the</p> <p>25 copy that we received?</p>	<p style="text-align: right;">Page 112</p> <p>1 someone to copy this notebook?</p> <p>2 A. To scan the notebook.</p> <p>3 Q. Who did you instruct to do that?</p> <p>4 A. Flory, my research assistant.</p> <p>5 Q. And did you instruct her to remove this table on</p> <p>6 Page 84?</p> <p>7 A. Absolutely not.</p> <p>8 Q. Do you know why it's not there?</p> <p>9 A. No idea, but the marks of this one are showing, and the</p> <p>10 graph is showing, so this should show up, I don't know</p> <p>11 why it's not showing up.</p> <p>12 Q. I'm going to direct you to Bates Stamp Page 62.</p> <p>13 A. Same thing.</p> <p>14 Q. Which is -- which corresponds to handwritten Page</p> <p>15 Number 87, there again is a chart --</p> <p>16 A. You referring to this one or this one?</p> <p>17 Q. I'm referring to 87, there again in the copy portion at</p> <p>18 the upper part of the page there is a table or a chart</p> <p>19 that is not included in the copy we've been given. Do</p> <p>20 you know why that is the case?</p> <p>21 MS. O'DELL: Objection to the form.</p> <p>22 THE WITNESS: So I think this is probably</p> <p>23 technical through scanning, I have no idea the answer</p> <p>24 is.</p> <p>25</p>
<p style="text-align: right;">Page 111</p> <p>1 A. No one removed anything.</p> <p>2 MS. O'DELL: Excuse me, when you say this is</p> <p>3 this, I don't know that that's clear on the record</p> <p>4 because you're pointing to the notebook.</p> <p>5 THE WITNESS: This is the results and this is</p> <p>6 the graph from the results.</p> <p>7 BY MR. HEGARTY:</p> <p>8 Q. Well, can you explain to us if this page was copied and</p> <p>9 included in Exhibit Number 1, why this chart is not in</p> <p>10 Exhibit Number 1?</p> <p>11 A. No idea.</p> <p>12 Q. You agree that --</p> <p>13 A. When we scanned it probably didn't show up, I don't</p> <p>14 know.</p> <p>15 Q. Well, you would agree that it would had to have been</p> <p>16 removed, correct; otherwise it would appear on the</p> <p>17 paper?</p> <p>18 A. I don't agree.</p> <p>19 Q. Well, you can tell on the copy that there are places</p> <p>20 there that look like where tape had appeared, correct?</p> <p>21 MS. O'DELL: Object to the form.</p> <p>22 THE WITNESS: So same thing here, tape</p> <p>23 appeared and it's there.</p> <p>24 BY MR. HEGARTY:</p> <p>25 Q. Did you instruct -- strike that. Did you instruct</p>	<p style="text-align: right;">Page 113</p> <p>1 BY MR. HEGARTY:</p> <p>2 Q. Then under --</p> <p>3 A. But we do have all the data.</p> <p>4 Q. Under that table there appears to be some very vague</p> <p>5 what appears to be handwriting. Can you explain what</p> <p>6 that is? That again is on Bates Stamp 62, Page 87 of</p> <p>7 the original lab notebook.</p> <p>8 A. I don't know what that is.</p> <p>9 Q. Doctor, is this lab notebook typical of the lab</p> <p>10 notebooks you generate for all the experiments you've</p> <p>11 conducted?</p> <p>12 MS. O'DELL: Object to the form.</p> <p>13 THE WITNESS: What do you mean by typical?</p> <p>14 BY MR. HEGARTY:</p> <p>15 Q. Well, is this -- the things we've talked about here</p> <p>16 this morning, would those same things appear in all the</p> <p>17 lab notebooks that you prepare as part of your</p> <p>18 experiments?</p> <p>19 MS. O'DELL: Object to the form.</p> <p>20 THE WITNESS: So for -- most of our</p> <p>21 experiments are documented in a lab notebook like this.</p> <p>22 BY MR. HEGARTY:</p> <p>23 Q. Do most of your experiments -- strike that -- do most</p> <p>24 of the notebooks of your experiments have whiteout in</p> <p>25 them?</p>

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<p style="text-align: right;">Page 114</p> <p>1 A. Oh, that's what you're saying?</p> <p>2 Q. Yes.</p> <p>3 A. No.</p> <p>4 Q. Have you ever seen one of your other notebooks for your</p> <p>5 lab experiments have whiteout in them and handwriting</p> <p>6 over that whiteout?</p> <p>7 A. It's not a general practice. The answer is I don't</p> <p>8 remember.</p> <p>9 Q. Does your lab have standard operating procedures for</p> <p>10 how a lab notebook is to be prepared?</p> <p>11 MS. O'DELL: Objection to the form.</p> <p>12 THE WITNESS: So from who? From our own lab?</p> <p>13 BY MR. HEGARTY:</p> <p>14 Q. Correct.</p> <p>15 A. So this is the procedure that we follow for our lab.</p> <p>16 Q. Do you have any written standards on how you are to</p> <p>17 prepare a lab notebook?</p> <p>18 A. No.</p> <p>19 Q. Do you instruct those within your lab on how to prepare</p> <p>20 a lab notebook based on any published methods for</p> <p>21 preparing a lab notebook?</p> <p>22 A. So most of our work nowadays -- in the past we used to</p> <p>23 do a lot of lab notebooks, but most of the work that we</p> <p>24 do right now, most of it is electronically, and just to</p> <p>25 keep a record in case something happened to electronic</p>	<p style="text-align: right;">Page 116</p> <p>1 the laboratory notebooks we've been looking at today on</p> <p>2 how to prepare lab notebooks, correct?</p> <p>3 A. I instruct the lady who did this, yes, how to prepare</p> <p>4 lab notebook.</p> <p>5 Q. Did you ever instruct her about what to do in the case</p> <p>6 of needing to correct information that has been written</p> <p>7 in the lab notebook?</p> <p>8 A. Yes, she actually knows that because on, I already</p> <p>9 instruct her not to do the whiteout, she did it</p> <p>10 anyways, but her defense was, oh, I am only doing it on</p> <p>11 words that we already -- on procedures that is not even</p> <p>12 supposed to be there, it's like a normal practice</p> <p>13 procedure that we have done many times.</p> <p>14 Q. Doctor, if you would turn over to Bates Stamp 25 in</p> <p>15 Exhibit Number 1, which is Page 53 in the notebook.</p> <p>16 A. ELISA.</p> <p>17 Q. Under the -- in the section on the upper part of the</p> <p>18 page there appears to be documentation of adding talc</p> <p>19 to the cells; is that correct?</p> <p>20 A. Where do you see that? Cells were seeded, density --</p> <p>21 Q. Can I look at it, Doctor?</p> <p>22 A. Treat with --</p> <p>23 Q. This part of the notebook, what is described where</p> <p>24 you're talking about X1 X2 X3?</p> <p>25 A. Okay. These are the dilution of talc that we used, 5</p>
<p style="text-align: right;">Page 115</p> <p>1 version, we print it and paste it in the lab notebook.</p> <p>2 So in the past we used to take more precautions for lab</p> <p>3 notebooks, but these days because of this electronic</p> <p>4 facilities and help, we just print it and paste it</p> <p>5 there.</p> <p>6 Q. Did you instruct those who prepared the lab notebooks</p> <p>7 that we've been looking at here today on how to prepare</p> <p>8 laboratory notebooks? Did that instruction come from</p> <p>9 you?</p> <p>10 A. Yes.</p> <p>11 Q. Was that instruction based on any published standards</p> <p>12 in the literature for how to prepare a lab notebook?</p> <p>13 A. That was based on what I've been told since 1983.</p> <p>14 Q. Where were you taught that in 1983?</p> <p>15 A. I did my Ph.D. in molecular biology.</p> <p>16 Q. Where was that?</p> <p>17 A. Where?</p> <p>18 Q. Yes.</p> <p>19 A. England.</p> <p>20 Q. What school in England?</p> <p>21 A. University of Essex.</p> <p>22 Q. You learned at the University of Essex on how to</p> <p>23 prepare a laboratory notebook?</p> <p>24 A. Sure.</p> <p>25 Q. You used that training to instruct those who prepared</p>	<p style="text-align: right;">Page 117</p> <p>1 micrograms, 20 micrograms, and 100 micrograms. These</p> <p>2 are the three doses that we used, and this is how we</p> <p>3 got them.</p> <p>4 Q. With these doses are you adding DMSO?</p> <p>5 A. The talc was dissolved in DMSO.</p> <p>6 Q. Does the lab notebook show how much DMSO was used for</p> <p>7 each sample?</p> <p>8 A. How much DMSO? Yeah.</p> <p>9 Q. Yes. Where is that?</p> <p>10 A. Let me see. So you -- where is it -- it's</p> <p>11 50 milligrams per ml, so one ml, that's the initial</p> <p>12 concentration, 50 milligrams of the talc with one ml of</p> <p>13 the DMSO.</p> <p>14 Q. Did the amount of DMSO increase with the increasing</p> <p>15 doses of talc?</p> <p>16 A. No, no, no, no, okay, let me explain this.</p> <p>17 MS. O'DELL: What page were you referring to,</p> <p>18 Doctor?</p> <p>19 BY MR. HEGARTY:</p> <p>20 Q. Thank you.</p> <p>21 A. The first page.</p> <p>22 Q. What's that page number?</p> <p>23 A. 1.</p> <p>24 Q. Page 1, okay.</p> <p>25 A. So let me explain this. So we prepare a stock solution</p>

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<p style="text-align: right;">Page 118</p> <p>1 of the talc powder plus DMSO, the solvent, which is</p> <p>2 50 milligrams per ml, you can upscale it, downscale it,</p> <p>3 from there we dilute, as you can see here, it says the</p> <p>4 exact delusions, and it says X1 times 10 to the 4th</p> <p>5 microgram per ml, that's what you want to get, and</p> <p>6 that's 15 ml times 5 micrograms per ml, that's the</p> <p>7 concentration desired, and then you take -- this will</p> <p>8 tell you how much volume you add to the cells. So we</p> <p>9 added 2.35 microliters that correspond to 5 micrograms</p> <p>10 per ml, 10 microliters corresponded to 20, and so on,</p> <p>11 50 corresponded to that, and then the untreated cells</p> <p>12 got that DMSO alone.</p> <p>13 MS. O'DELL: What page --</p> <p>14 BY MR. HEGARTY:</p> <p>15 Q. The DMSO at 2.5, 10, and 50?</p> <p>16 A. DMSO.</p> <p>17 Q. DMSO at 2.5, 10, and 50?</p> <p>18 MS. O'DELL: Excuse me, what page are you</p> <p>19 referring to?</p> <p>20 THE WITNESS: This Page 53 right here.</p> <p>21 No, so the DMSO has no concentration. The</p> <p>22 DMSO is the solvent where you dilute, dissolve the</p> <p>23 talc.</p> <p>24 BY MR. HEGARTY:</p> <p>25 Q. My question is -- was, though, with regard to the</p>	<p style="text-align: right;">Page 120</p> <p>1 Does the assay work by you measuring the amount of</p> <p>2 color change?</p> <p>3 MS. O'DELL: Object to the form.</p> <p>4 THE WITNESS: The answer -- I just answered</p> <p>5 you.</p> <p>6 BY MR. HEGARTY:</p> <p>7 Q. Which is?</p> <p>8 A. Are you referring to --</p> <p>9 Q. Well, explain how it works with regard to color.</p> <p>10 A. Okay, oh, I would love to, I'll be very happy to do</p> <p>11 that. Okay, so this is measuring the optical density</p> <p>12 of the concentration of the protein that is correlated</p> <p>13 to the -- how much protein is there. You measure the</p> <p>14 optical density absorbance at 5, 62 nanometer, and you</p> <p>15 construct a standard curve from BSA, and the standard</p> <p>16 curve is known concentration, and it tells you when</p> <p>17 it -- where is the absorption and what's the slope of</p> <p>18 the line, and that helps you extrapolate the unknown</p> <p>19 samples from your standard curve.</p> <p>20 Q. So is --</p> <p>21 A. It is a colorimetric assay.</p> <p>22 Q. It's measuring a color change, correct?</p> <p>23 A. No.</p> <p>24 Q. When you say colorimetric assay, what do you mean?</p> <p>25 A. It's extension coefficient, it measures BSA at specific</p>
<p style="text-align: right;">Page 119</p> <p>1 controls --</p> <p>2 A. Volumes, you use volumes.</p> <p>3 Q. -- did you, for each level of talc applied to the</p> <p>4 cells, for the corresponding controls did you also</p> <p>5 apply DMSO?</p> <p>6 A. Yes.</p> <p>7 Q. At what volume?</p> <p>8 A. It's 2.5, 10, and 50.</p> <p>9 Q. Of DMSO alone?</p> <p>10 A. Correct.</p> <p>11 Q. If you turn over to Page 55, I'm sorry, 53 in the lab</p> <p>12 notebook, which is Bates Stamped 27 in the copy</p> <p>13 version, Page 53.</p> <p>14 A. This one? Same page?</p> <p>15 Q. 55, Page 55 of the lab notebook, which is Bates Stamped</p> <p>16 27.</p> <p>17 A. Okay.</p> <p>18 Q. Is this -- does this page describe the BCA protein</p> <p>19 detection assay?</p> <p>20 A. Correct.</p> <p>21 Q. And does the assay work by measuring the amount of</p> <p>22 color change, that is, the more color change you</p> <p>23 detect, the greater the response it indicates?</p> <p>24 A. Are you saying it's a colorimetric assay?</p> <p>25 Q. Well, I'm not sure. I can ask it in a different way.</p>	<p style="text-align: right;">Page 121</p> <p>1 wavelength.</p> <p>2 Q. And what did you do to validate that the assay would</p> <p>3 work with the presence of talc?</p> <p>4 A. What assay?</p> <p>5 Q. This assay.</p> <p>6 A. This assay is not for talc, this assay is a standard</p> <p>7 curve to measure -- to use a standard for -- so we can</p> <p>8 apply the same amount of protein for each sample.</p> <p>9 Q. But you are using -- you are measuring the samples</p> <p>10 after they've been -- after talc has been applied,</p> <p>11 correct?</p> <p>12 A. We are measuring each like, for example, okay --</p> <p>13 MS. O'DELL: Refer to a specific page.</p> <p>14 THE WITNESS: Let's say, for example,</p> <p>15 catalase, so we are measuring catalase, but to measure</p> <p>16 catalase, you need to compare between samples, right?</p> <p>17 You need to compare between treated versus untreated.</p> <p>18 How are you -- how can you determine that you have the</p> <p>19 same amount of protein? What if you have more protein</p> <p>20 here than here? The results is not accurate. So we</p> <p>21 use BSA as a standard to measure and standardize all</p> <p>22 the samples to the same amount of protein, so the</p> <p>23 comparison would be -- the comparison would be</p> <p>24 accurate.</p> <p>25</p>

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<p style="text-align: right;">Page 122</p> <p>1 BY MR. HEGARTY:</p> <p>2 Q. How did you rule out the possibility that the color</p> <p>3 change or the wavelength change was due to the talc</p> <p>4 particles themselves as opposed to any effect they were</p> <p>5 having?</p> <p>6 MS. O'DELL: Object to the form.</p> <p>7 THE WITNESS: Yeah, so we use the same cell</p> <p>8 line, we split the cells, we grow the cells, some cells</p> <p>9 get the talcum powder, the same cells, the other</p> <p>10 aliquot get no talcum powder, we extract proteins, we</p> <p>11 correct for the differences in the extraction of</p> <p>12 proteins, and then we run catalase, for example.</p> <p>13 BY MR. HEGARTY:</p> <p>14 Q. Within the proteins extracted, would there still be</p> <p>15 talc particles?</p> <p>16 A. No, no.</p> <p>17 Q. How do you know there are not talc particles?</p> <p>18 A. Because these are total proteins. You extract</p> <p>19 proteins. There is a process of extraction of</p> <p>20 proteins. You wash off all the media, you precipitate</p> <p>21 the cells, you lyse the cells, you extract proteins.</p> <p>22 Q. How many times did you repeat the experiment you just</p> <p>23 described for catalase?</p> <p>24 A. So all this work from January 24th till the end of this</p> <p>25 work, it's done in triplicate.</p>	<p style="text-align: right;">Page 124</p> <p>1 A. I am not measuring the protein, I'm measuring catalase.</p> <p>2 Q. You're measuring the catalase.</p> <p>3 A. Catalase and control cells versus treated cells, okay,</p> <p>4 in triplicates.</p> <p>5 Q. So you measure it once using the same sample, you</p> <p>6 measure the same sample two more times?</p> <p>7 A. Okay, oh, now I understand your question, okay. So</p> <p>8 this triplicate is for the assay, so we did one, two,</p> <p>9 three, four, five, six cell lines in triplicate each</p> <p>10 time point.</p> <p>11 Q. When you say in triplicate, does that mean you have</p> <p>12 three sets of petri dishes or are you doing one set of</p> <p>13 petri dishes and you're doing the test three times?</p> <p>14 MS. O'DELL: Objection.</p> <p>15 THE WITNESS: So it is -- this one here is</p> <p>16 one set of petri dish, and it's done in triplicate for</p> <p>17 each time point.</p> <p>18 BY MR. HEGARTY:</p> <p>19 Q. So you didn't -- for each cell line you didn't have</p> <p>20 three --</p> <p>21 A. Independent.</p> <p>22 Q. -- independent cultures and then test each independent</p> <p>23 culture against the others. You had one independent</p> <p>24 culture you tested three times?</p> <p>25 MS. O'DELL: Object to the form.</p>
<p style="text-align: right;">Page 123</p> <p>1 Q. What does being done in triplicate mean?</p> <p>2 A. Every experiment is done in triplicate.</p> <p>3 Q. Explain that to me.</p> <p>4 A. Okay. So, for example, if you look at, see how --</p> <p>5 Q. What are you looking at?</p> <p>6 A. For example, 56, if you look at 56, look at the table.</p> <p>7 MS. O'DELL: Give us just a minute to get</p> <p>8 there.</p> <p>9 Q. Okay, go ahead.</p> <p>10 A. You have the table?</p> <p>11 Q. Yes.</p> <p>12 A. Okay. If you look at the table it says -- this</p> <p>13 particular ovarian cancer cell line, TOV-112-C, you</p> <p>14 have C, you have 5 microgram, you have 20 micrograms,</p> <p>15 and you have 100 microgram, you see them? And you can</p> <p>16 see OD1, OD2, OD3, blank, blank, blank, so triplicate,</p> <p>17 three times. The blank three times, the experiment</p> <p>18 three times, and subtract from the blank and do the</p> <p>19 calculation.</p> <p>20 Q. You're measuring the same protein extracted three</p> <p>21 times?</p> <p>22 MS. O'DELL: Object to the form.</p> <p>23 BY MR. HEGARTY:</p> <p>24 Q. Is that correct?</p> <p>25</p>	<p style="text-align: right;">Page 125</p> <p>1 BY MR. HEGARTY:</p> <p>2 Q. Is that correct?</p> <p>3 MS. O'DELL: If you need to read his</p> <p>4 question, it was confusing.</p> <p>5 THE WITNESS: Independent cultures, what does</p> <p>6 that mean?</p> <p>7 BY MR. HEGARTY:</p> <p>8 Q. Well, I tried to use your word.</p> <p>9 A. I know.</p> <p>10 Q. Did you have for each cell line three separate petri</p> <p>11 dishes, three petri dishes, so you ran the experiment</p> <p>12 essentially three times for each cell line or did you</p> <p>13 have one petri dish with a cell line in it, extract the</p> <p>14 catalase, and run that extraction three times?</p> <p>15 A. No, no, no. How can you -- okay, I'm confused now.</p> <p>16 Okay, so how can you have one petri dish and you</p> <p>17 extract three time points of treatment?</p> <p>18 Q. I'm not asking you --</p> <p>19 A. So we have three, we have three, we have actually four,</p> <p>20 one, two, three, four, four independent culture dishes</p> <p>21 for each treatment.</p> <p>22 Q. Correct.</p> <p>23 A. That is done in triplicate.</p> <p>24 Q. And what you say in triplicate, that means you're</p> <p>25 taking the extraction and you're testing it three</p>

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<p>1 times, the same extraction.</p> <p>2 A. For each time point.</p> <p>3 Q. For each time point.</p> <p>4 A. Yes.</p> <p>5 Q. You don't have petri dishes that have the same cells in</p> <p>6 it for three separate petri dishes, then doing the</p> <p>7 extractions for each of those three petri dishes, do</p> <p>8 you follow my question?</p> <p>9 A. Yeah, I follow the question.</p> <p>10 MS. O'DELL: Objection.</p> <p>11 THE WITNESS: You cannot do that because then</p> <p>12 you have to do triplicate of triplicate.</p> <p>13 BY MR. HEGARTY:</p> <p>14 Q. Exactly.</p> <p>15 A. Have I done that?</p> <p>16 Q. Yes.</p> <p>17 A. No.</p> <p>18 Q. Okay. That was my question.</p> <p>19 A. Not for this assay.</p> <p>20 Q. Have you ever done assays like that where you've had --</p> <p>21 A. Yes.</p> <p>22 Q. -- multiple?</p> <p>23 MS. O'DELL: Let him finish.</p> <p>24 BY MR. HEGARTY:</p> <p>25 Q. Have you done assays like that where you've used the</p>	<p>1 MS. O'DELL: So you wanted 26 of the Bates,</p> <p>2 and that's at the bottom left corner 54.</p> <p>3 THE WITNESS: This?</p> <p>4 BY MR. HEGARTY:</p> <p>5 Q. Yes. Your sample ID for -- your sample IDs run from</p> <p>6 356 to 386, is that right?</p> <p>7 A. So let me understand your question. Are these numbers</p> <p>8 in serial number?</p> <p>9 Q. Are these the sample ID numbers of your tests?</p> <p>10 A. Okay, so the sample ID correspond to each specimen,</p> <p>11 yes, each cells.</p> <p>12 Q. And those sample IDs run in chronologic order from 356</p> <p>13 to 386?</p> <p>14 A. No, they're missing. For example, there is 60 -- where</p> <p>15 is it -- actually, 84, 85, yes, they are.</p> <p>16 Q. So you're right, they jump from 371 to 379, do you see</p> <p>17 that?</p> <p>18 A. Yeah.</p> <p>19 Q. Why is that?</p> <p>20 A. Because, you see, these are already, these cells were</p> <p>21 treated in different times, so that's why they get</p> <p>22 different IDs.</p> <p>23 Q. Okay.</p> <p>24 A. This is a lot of work. You can't do it in one time.</p> <p>25 Q. What type of test is -- or strike that. Then if you</p>
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<p>1 same cell line in three different dishes and done the</p> <p>2 triplicate, triplicate, triplicate off of each dish?</p> <p>3 MS. O'DELL: Object to the form.</p> <p>4 THE WITNESS: Okay, so in the past I have</p> <p>5 done -- this is a very important question, it is always</p> <p>6 raised when we submit our data to be considered for</p> <p>7 publication, they will say did you do a real triplicate</p> <p>8 or a triplicate of the assay. So the answer is we have</p> <p>9 done that in the past, and in our system here there is</p> <p>10 no difference between -- because catalase have been</p> <p>11 done in our lab, we published with it, it is a standard</p> <p>12 protocol in our lab, and we never have -- we test it</p> <p>13 for intra-assay variation triplicates, and that was not</p> <p>14 the case. Did we test that? Yes, we did, but not for</p> <p>15 talc treatment per se, because these are established</p> <p>16 protocols in our lab, we already know and we learn from</p> <p>17 them, so you don't really need to do a triplicate of a</p> <p>18 triplicate of a triplicate.</p> <p>19 BY MR. HEGARTY:</p> <p>20 Q. Thank you. On Page 26 of the Bates Stamp document</p> <p>21 Number 1, which is after --</p> <p>22 MS. O'DELL: 54 of the lab.</p> <p>23 MR. HEGARTY: Is it 54 of the lab notebook?</p> <p>24 Because I can't -- my page doesn't have a handwritten</p> <p>25 number.</p>	<p>1 turn over to Page 69 of Exhibit Number 1, which, again,</p> <p>2 my copy doesn't have a handwritten page number on it.</p> <p>3 MR. LAPINSKI: Counsel, just to confirm, when</p> <p>4 you refer to page numbers, you're referring to the</p> <p>5 Bates Numbers, correct?</p> <p>6 MR. HEGARTY: In this case I'm referring to</p> <p>7 Page 69 in Exhibit Number 1, which is the Bates Number.</p> <p>8 MS. O'DELL: Well, and to be -- I think in</p> <p>9 the lower right-hand corner of your page that's 94, and</p> <p>10 that's what was produced so --</p> <p>11 MR. HEGARTY: If you go to Page 94, then,</p> <p>12 Doctor.</p> <p>13 BY MR. HEGARTY:</p> <p>14 Q. It should be this.</p> <p>15 A. Yes.</p> <p>16 Q. Are those the same sample numbers that we looked at in</p> <p>17 the prior -- on the prior page?</p> <p>18 A. What page was it? Sorry.</p> <p>19 Q. That was Page 54.</p> <p>20 A. Yes.</p> <p>21 Q. Do those refer to the same samples?</p> <p>22 A. Yes.</p> <p>23 Q. If you turn next, then, to page Bates Number 76 Exhibit</p> <p>24 Number 1, Page 100 in the laboratory notebook, there</p> <p>25 are -- do you see what I'm referring you to, Doctor,</p>

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<p style="text-align: right;">Page 130</p> <p>1 Page 100?</p> <p>2 A. Yes.</p> <p>3 Q. There are again sample numbers listed there. Are those</p> <p>4 for a different test?</p> <p>5 A. This is for different test, this is Caspase-3 activity.</p> <p>6 Q. Are you using the same sample numbers as in the</p> <p>7 previous test?</p> <p>8 A. It should indicate here, so 368, 369, 370, so the</p> <p>9 answer is yes, some of them, the numbers that</p> <p>10 correspond they are -- let me see, hold on, let me just</p> <p>11 make sure. So this is for ELISA, we did the normal --</p> <p>12 so the answer is yes.</p> <p>13 Q. If you're using the same numbers for different tests,</p> <p>14 how are you able to keep those straight?</p> <p>15 MS. O'DELL: Objection, form.</p> <p>16 THE WITNESS: Okay. So let me explain this.</p> <p>17 So here, this is the sample ID, the treated cells.</p> <p>18 BY MR. HEGARTY:</p> <p>19 Q. That's on Page --</p> <p>20 A. 54.</p> <p>21 Q. Okay.</p> <p>22 A. So this is the sample ID, and this is what are they,</p> <p>23 what each cell line definition. Now, this was</p> <p>24 subjected to isolation of protein, okay, and we use</p> <p>25 BSA, as we discussed, as a standard, then you isolate</p>	<p style="text-align: right;">Page 132</p> <p>1 SAED DEPOSITION EXHIBIT NUMBER 11,</p> <p>2 NOTEBOOKS,</p> <p>3 WAS MARKED BY THE REPORTER</p> <p>4 FOR IDENTIFICATION</p> <p>5 BY MR. HEGARTY:</p> <p>6 Q. So Exhibit Number 11 is the notebook you brought with</p> <p>7 you to the deposition here today?</p> <p>8 A. This, yes.</p> <p>9 MS. O'DELL: There are actually two parts.</p> <p>10 BY MR. HEGARTY:</p> <p>11 Q. There are two parts. Where is the other part?</p> <p>12 MS. O'DELL: It's right here.</p> <p>13 BY MR. HEGARTY:</p> <p>14 Q. Both parts of the notebook contain what?</p> <p>15 A. So references 86 continued 89.</p> <p>16 Q. Did you compile Exhibit Number 11? Did you put that</p> <p>17 together?</p> <p>18 A. Number 11 we're talking about? Sorry.</p> <p>19 Q. Number 11 are both notebooks.</p> <p>20 A. Yes.</p> <p>21 Q. Did you choose the articles to put in Exhibit</p> <p>22 Number 11?</p> <p>23 A. My references from the articles, yes.</p> <p>24 MS. O'DELL: Just I think there's some lack</p> <p>25 of clarity. You chose the articles. Did you copy the</p>
<p style="text-align: right;">Page 131</p> <p>1 the total protein from it, now you can do what we did,</p> <p>2 we can do catalase, we can do SOD, we can do different</p> <p>3 markers from total proteins. Caspase-3 is included.</p> <p>4 Q. Got you, okay thank you. I'm probably going into a</p> <p>5 different section that's going to take a while if you</p> <p>6 want to take a break now or keep going.</p> <p>7 MS. O'DELL: It's 12:15, Doctor, would you</p> <p>8 like a short break for lunch or what's your preference?</p> <p>9 THE WITNESS: Yes.</p> <p>10 MR. HEGARTY: Let's go off the record.</p> <p>11 THE VIDEOGRAPHER: Going off the record at</p> <p>12 12:16 p.m.</p> <p>13 (A recess was taken.)</p> <p>14 THE VIDEOGRAPHER: We are back on the record</p> <p>15 at 1:26 p.m.</p> <p>16 BY MR. HEGARTY:</p> <p>17 Q. Doctor, you brought with you a notebook that appears to</p> <p>18 contain articles and perhaps a number of other</p> <p>19 documents. What is in the notebook that you have in</p> <p>20 front of you?</p> <p>21 A. So I have my report that I submitted, my CV, and my</p> <p>22 references.</p> <p>23 Q. I'll mark that notebook as Exhibit Number 11.</p> <p>24</p> <p>25</p>	<p style="text-align: right;">Page 133</p> <p>1 pages?</p> <p>2 THE WITNESS: No.</p> <p>3 BY MR. HEGARTY:</p> <p>4 Q. Did you put the notebooks together yourself?</p> <p>5 A. No.</p> <p>6 Q. Do you know who put the notebooks together?</p> <p>7 MS. O'DELL: Objection, it's a little vague.</p> <p>8 THE WITNESS: You guys did it.</p> <p>9 BY MR. HEGARTY:</p> <p>10 Q. Counsel for Plaintiffs put the notebooks together?</p> <p>11 A. What do you call them, sorry?</p> <p>12 Q. Counsel for Plaintiffs put the notebooks --</p> <p>13 A. Yes, sorry, I'm just having -- I thought that I put the</p> <p>14 references together, yes.</p> <p>15 Q. I want to talk in more detail about Exhibit Number 7.</p> <p>16 That's your manuscript.</p> <p>17 A. Okay.</p> <p>18 Q. When did the writing process begin for Exhibit 7? And</p> <p>19 this goes back to the original version that you</p> <p>20 submitted to --</p> <p>21 A. Yes.</p> <p>22 Q. -- OB-GYN Oncology.</p> <p>23 A. September I think.</p> <p>24 Q. Do you know approximately when in September?</p> <p>25 A. I can't remember.</p>

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<p style="text-align: right;">Page 134</p> <p>1 Q. Dr. Fletcher is identified as the lead author. How did 2 that come about? 3 A. She is not the lead author. 4 Q. Who is the lead author? 5 A. I am. 6 Q. The reason I thought she was lead author is on the 7 second page of Exhibit Number 7 after the title she's 8 the first author listed. 9 A. That's -- lead author is the corresponding author, 10 that's me. 11 Q. What was the involvement of -- strike that. What was 12 Dr. Fletcher's involvement in the preparation of this 13 article? 14 A. So for the articles, she helped in doing the -- on this 15 article or experiments, the whole thing, or just this 16 article? 17 Q. Just on the article. 18 A. Okay, so her role was basically reading after me make 19 sure that the methods are what we really used, typos 20 and like help read proofing. 21 Q. What was Dr. Harper's involvement in preparation of the 22 manuscript? 23 A. Analysis of data, interpretation of data, she's a 24 clinical OB-GYN oncologist. 25 Q. What was Dr. -- or, I'm sorry, what was Ira Memaj?</p>	<p style="text-align: right;">Page 136</p> <p>1 article besides those we talked about? 2 A. No, so she -- that's why she's in the acknowledgment, 3 not in the authorship, because she was repeating 4 experiments. 5 Q. In connection with the experiments that you conducted 6 that went into preparing or that led to preparing of 7 this manuscript, did you prepare a proposal to request 8 funding of the experiments in the article? 9 MS. O'DELL: Object to the form. 10 THE WITNESS: I created a budget so to see 11 how much this will cost me. 12 BY MR. HEGARTY: 13 Q. When you seek funding from NIH, for example, or another 14 organization, you have to prepare a formal grant 15 request where you set out and provide certain 16 information describing what you intend to do and how 17 much it's going to cost, correct? 18 A. For NIH? 19 Q. Yes. 20 A. Yes. 21 Q. Did you prepare any kind of grant request in connection 22 with the experiments that went into preparing this 23 manuscript? 24 MS. O'DELL: Object to the form, other than 25 he's testified to.</p>
<p style="text-align: right;">Page 135</p> <p>1 A. Ira Memaj was a medical student that helped also in 2 looking for the grammar and proofreading mostly. 3 Q. What was Rong Fan's involvement? 4 A. Same thing. Now, the authors that are here, not 5 necessarily because they participated in writing the 6 manuscript, but they own the authorship because they 7 participated in the work that created the manuscript. 8 Q. What was Robert Morris's -- Dr. Robert Morris's -- 9 A. Dr. Morris is the OB-GYN Oncology chief, and he helped 10 in also editing the manuscript and help interpretation 11 of data clinically. 12 Q. Who prepared the original manuscript? Who was the 13 author? 14 A. I did. 15 Q. Did anyone help you write the original manuscript? 16 A. No. 17 Q. Did anyone in any way contribute to the manuscript 18 besides those individuals listed in Exhibit Number 7? 19 A. No. 20 Q. Over on Page 12 in the Acknowledgments section there's 21 a notation thanking Imaan Singh. 22 A. Yes, she was a medical student. 23 Q. What did Imaan Singh do? 24 A. She helped in running some experiments for us. 25 Q. Anyone else assist in any way in the preparation of the</p>	<p style="text-align: right;">Page 137</p> <p>1 THE WITNESS: The answer is no. 2 BY MR. HEGARTY: 3 Q. Did you submit the budget you created to anybody? 4 A. Official funding agencies, no. 5 Q. Did you provide the budget to Counsel for Plaintiffs, 6 Beasley Allen? 7 A. I can't remember. 8 Q. Do you still have a copy of the budget? 9 A. I do. 10 Q. Did you prepare any type of protocol or outline in 11 advance of the experiments describing the methods or 12 goals of the experiments? 13 A. In writing? 14 Q. In writing. 15 A. I don't remember. 16 Q. Is that something that's commonly done -- or strike 17 that. Is that something you commonly do in your work 18 in connection with doing studies that then go into a 19 journal article? 20 MS. O'DELL: Object to the form. 21 THE WITNESS: So the way I do this, this 22 is -- again, this is routinely done in our lab, and we 23 ran a pilot experiment using PCR, using single dose, 24 and when we saw the data and we saw that there's a 25 biological effect, then we had a plan of what to do,</p>

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<p>1 and which is the whole study.</p> <p>2 BY MR. HEGARTY:</p> <p>3 Q. Do you prepare that plan in writing?</p> <p>4 A. In writing?</p> <p>5 Q. Yes.</p> <p>6 A. I really don't need to because it's the technology</p> <p>7 again, it is all applied in our laboratory, and we are</p> <p>8 testing the markers that we been extensively publishing</p> <p>9 on and testing through our lab.</p> <p>10 Q. For any articles that you have published in scientific</p> <p>11 journals, have you ever prepared an outline or protocol</p> <p>12 describing what you're going to do before you actually</p> <p>13 do the experiments?</p> <p>14 MS. O'DELL: Object to the form.</p> <p>15 THE WITNESS: Yeah, so, again, I'm just</p> <p>16 trying to explain to you that the methodology is in</p> <p>17 place, it's in the lab, it's been published, it's been</p> <p>18 referenced, and we test the same markers over and over,</p> <p>19 so there is no need to every time write this down.</p> <p>20 BY MR. HEGARTY:</p> <p>21 Q. But have you ever prepared in connection with a journal</p> <p>22 article you're going to hopefully write after doing</p> <p>23 experiments an outline or an overview or a summary of</p> <p>24 what you're going to do before you then go on and do</p> <p>25 it?</p>	<p>1 BY MR. HEGARTY:</p> <p>2 Q. So tell me again what meetings this --</p> <p>3 A. SRI.</p> <p>4 Q. -- testing was presented.</p> <p>5 A. SRI March 2018, and then if I recall correctly, ASRM</p> <p>6 October --</p> <p>7 MS. O'DELL: ASRM, is that what you're</p> <p>8 saying?</p> <p>9 THE WITNESS: No, it wasn't ASRM. I forgot</p> <p>10 which the other one -- SGO, SGO, I forgot where I</p> <p>11 submitted, sorry, but I did submit two abstracts and I</p> <p>12 presented them in national meetings, SRI for sure was</p> <p>13 March -- I believe it was SGO.</p> <p>14 MS. O'DELL: For the record, Doctor, what</p> <p>15 does SGO stand for?</p> <p>16 THE WITNESS: Society of Gynecology and</p> <p>17 Oncology.</p> <p>18 BY MR. HEGARTY:</p> <p>19 Q. In March of 2018?</p> <p>20 A. The SRI meeting, yes, that was the preliminary study.</p> <p>21 Q. The lab notebook you provided includes entries for work</p> <p>22 that occurred after March 2018, correct?</p> <p>23 A. Correct.</p> <p>24 Q. What did you then present in March of 2018?</p> <p>25 A. We presented the work that we did preliminary just to</p>
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<p>1 A. We write the methodology.</p> <p>2 Q. So you have written methodologies for what you're going</p> <p>3 to do before you actually start the experiments?</p> <p>4 MS. O'DELL: Object to the form, that's not</p> <p>5 what he said.</p> <p>6 THE WITNESS: Not this experiment.</p> <p>7 BY MR. HEGARTY:</p> <p>8 Q. On other occasions you have done that?</p> <p>9 A. Yes.</p> <p>10 Q. On other occasions when you have published articles in</p> <p>11 scientific and medical journals?</p> <p>12 A. Not all the times, no.</p> <p>13 Q. When is it that you do prepare an outline or protocol?</p> <p>14 A. When it is something that is not routinely daily test</p> <p>15 that is performed in our laboratory, something</p> <p>16 different.</p> <p>17 Q. Did you discuss the results of the testing or the</p> <p>18 experiments with anyone outside of the authors on the</p> <p>19 manuscript?</p> <p>20 MS. O'DELL: Objection to form.</p> <p>21 THE WITNESS: Yes, so the answer -- I'm</p> <p>22 sorry, that wasn't the answer. This part of this work</p> <p>23 was accepted and presented at national meetings, was</p> <p>24 presented at SRI, presented at ASRM, and it was open</p> <p>25 for everybody to discuss.</p>	<p>1 show the effect on using just PCR.</p> <p>2 Q. Did you discuss the contents of the manuscript, Exhibit</p> <p>3 Number 7, with anyone besides the authors during the</p> <p>4 time it was being written?</p> <p>5 A. No.</p> <p>6 Q. Did you discuss the contents of the manuscript during</p> <p>7 the time it was being written with attorneys for</p> <p>8 Beasley Allen or any other Plaintiff's Counsel in this</p> <p>9 case?</p> <p>10 MS. O'DELL: Don't discuss -- I'm going to</p> <p>11 instruct you not to answer that question.</p> <p>12 BY MR. HEGARTY:</p> <p>13 Q. Doctor, if you would turn to --</p> <p>14 UNIDENTIFIED ATTORNEY: Excuse me, was that a</p> <p>15 yes or no question? You're instructing him not to</p> <p>16 answer whether he discussed the contents?</p> <p>17 MS. O'DELL: Well, the question presupposes</p> <p>18 the subject matter of the discussion and that's the --</p> <p>19 so I'm going to instruct him not to answer the</p> <p>20 question.</p> <p>21 BY MR. HEGARTY:</p> <p>22 Q. Doctor, would you turn to Page 12 of Exhibit 7, please.</p> <p>23 Did you prepare the Conflict of Interest section on</p> <p>24 Page 12?</p> <p>25 A. Yes.</p>

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<p style="text-align: right;">Page 142</p> <p>1 Q. For whom did you act as a consultant for a fee?</p> <p>2 A. Beasley Allen.</p> <p>3 Q. Why didn't you disclose Beasley Allen in this Conflict</p> <p>4 of Interest disclosure?</p> <p>5 A. The name you mean?</p> <p>6 Q. Yes.</p> <p>7 A. Just add the name? I didn't do it.</p> <p>8 Q. At the time you prepared this manuscript, you were</p> <p>9 acting as a consultant for Beasley Allen in litigation</p> <p>10 involving the topic of this paper, correct?</p> <p>11 A. Correct.</p> <p>12 Q. But you didn't identify that in the Conflict of</p> <p>13 Interest disclosure that you were acting as a</p> <p>14 consultant in litigation involving this topic for a</p> <p>15 fee, correct?</p> <p>16 MS. O'DELL: Objection to form.</p> <p>17 THE WITNESS: The journal, this is sufficient</p> <p>18 language for the journal.</p> <p>19 BY MR. HEGARTY:</p> <p>20 Q. But you did not disclose that you were acting as a</p> <p>21 consultant in litigation involving this topic, correct?</p> <p>22 MS. O'DELL: Objection to form.</p> <p>23 THE WITNESS: This is what I disclosed.</p> <p>24 BY MR. HEGARTY:</p> <p>25 Q. At the time you prepared this disclosure, you were</p>	<p style="text-align: right;">Page 144</p> <p>1 A. No reason, I could add this --</p> <p>2 Q. You say in the disclosure that you acted as a</p> <p>3 consultant regarding this topic for a fee. What was</p> <p>4 the fee?</p> <p>5 A. What was the fee?</p> <p>6 Q. Yes.</p> <p>7 A. I think \$600 an hour.</p> <p>8 Q. Was the fee the total amount you gave us for your</p> <p>9 invoices at the beginning of the deposition?</p> <p>10 A. Yes. No?</p> <p>11 MS. O'DELL: Sorry, I was going to object, it</p> <p>12 was a little unclear, but I think you understood his</p> <p>13 question.</p> <p>14 BY MR. HEGARTY:</p> <p>15 Q. Doctor, don't you agree that anyone reading this</p> <p>16 article should know that you are a paid expert for</p> <p>17 lawyers who have a financial interest in this subject</p> <p>18 area?</p> <p>19 MS. O'DELL: Object to the form.</p> <p>20 THE WITNESS: Again, my response would be I</p> <p>21 put the conflict of interest that I'm acting as a</p> <p>22 consultant on this topic.</p> <p>23 BY MR. HEGARTY:</p> <p>24 Q. Don't you think the --</p> <p>25</p>
<p style="text-align: right;">Page 143</p> <p>1 acting as a consultant -- strike that. At the time</p> <p>2 that you prepared this conflict of interest, you were</p> <p>3 acting as a named testifying expert in the</p> <p>4 litigation -- in the talc litigation for plaintiffs</p> <p>5 lawyers, correct?</p> <p>6 A. Is that the same question? Yes.</p> <p>7 Q. So at the time that you prepared this disclosure, you</p> <p>8 were not just a consultant, you were a testifying</p> <p>9 expert witness in litigation, correct?</p> <p>10 MS. O'DELL: Objection to form.</p> <p>11 THE WITNESS: As far as I know, I'm a</p> <p>12 consultant, witness expert to consult in this matter,</p> <p>13 yes.</p> <p>14 BY MR. HEGARTY:</p> <p>15 Q. You did not disclose this relationship in the</p> <p>16 acknowledgment, that is, this relationship that you</p> <p>17 were a designated testifying expert in litigation</p> <p>18 involving talc and ovarian cancer, correct?</p> <p>19 A. The language that I wrote here was sufficient by the</p> <p>20 journal.</p> <p>21 MR. KLATT: Objection, nonresponsive.</p> <p>22 BY MR. HEGARTY:</p> <p>23 Q. Why didn't you disclose in this acknowledgment that you</p> <p>24 were a designated expert on behalf of plaintiffs in</p> <p>25 litigation involving talc and ovarian cancer?</p>	<p style="text-align: right;">Page 145</p> <p>1 A. -- for a fee.</p> <p>2 Q. Don't you think the potential readers of this article</p> <p>3 are entitled to know that you are using this article to</p> <p>4 profit on this topic?</p> <p>5 MS. O'DELL: Objection to form.</p> <p>6 THE WITNESS: This is the language that is</p> <p>7 requested by the journal.</p> <p>8 BY MR. HEGARTY:</p> <p>9 Q. Don't you think that anyone reading this article would</p> <p>10 want to know that you have a financial interest in this</p> <p>11 topic?</p> <p>12 A. It says clearly fee, for a fee.</p> <p>13 Q. You don't identify, though, the area of this topic in</p> <p>14 which you're consulting, correct?</p> <p>15 MS. O'DELL: Objection to form.</p> <p>16 THE WITNESS: So for the reader of this, our</p> <p>17 readers, it's enough to say I'm a consultant for a fee</p> <p>18 on this topic.</p> <p>19 BY MR. HEGARTY:</p> <p>20 Q. You are getting paid in this litigation to testify on</p> <p>21 behalf of plaintiffs, correct?</p> <p>22 A. Yes.</p> <p>23 Q. Your testimony is supported by the manuscript, by</p> <p>24 Exhibit Number 7, correct?</p> <p>25 MS. O'DELL: Objection to form.</p>

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<p style="text-align: right;">Page 146</p> <p>1 THE WITNESS: It's -- part of it is in the</p> <p>2 manuscript and part of it is not.</p> <p>3 BY MR. HEGARTY:</p> <p>4 Q. You stand to benefit financially to the extent</p> <p>5 Plaintiff's Counsel use your article successfully in</p> <p>6 this litigation, correct?</p> <p>7 MS. O'DELL: Object to the form.</p> <p>8 THE WITNESS: I didn't understand the</p> <p>9 question.</p> <p>10 BY MR. HEGARTY:</p> <p>11 Q. You stand to benefit financially to the extent that</p> <p>12 Plaintiff's Counsel use your article in this</p> <p>13 litigation, correct?</p> <p>14 MS. O'DELL: Object to the form.</p> <p>15 THE WITNESS: Can you -- I know but I don't</p> <p>16 understand what you really want to say.</p> <p>17 BY MR. HEGARTY:</p> <p>18 Q. You stand to benefit financially, make more money by</p> <p>19 Plaintiff's Counsel using your article in this</p> <p>20 litigation, correct?</p> <p>21 MS. O'DELL: Object to the form.</p> <p>22 THE WITNESS: No, I'm not aware, how they</p> <p>23 going to make more money by using this?</p> <p>24 BY MR. HEGARTY:</p> <p>25 Q. Well, they will continue to use you as an expert</p>	<p style="text-align: right;">Page 148</p> <p>1 BY MR. HEGARTY:</p> <p>2 Q. The rest of the conflict of interest disclosure says</p> <p>3 that no other -- the authors declare -- the other</p> <p>4 authors declare there are no conflicts of interest; do</p> <p>5 you see that?</p> <p>6 A. I do.</p> <p>7 Q. So did any of the other authors consult on this topic</p> <p>8 for a fee, to your knowledge?</p> <p>9 A. To my knowledge, no.</p> <p>10 Q. Were the other authors on this manuscript aware of your</p> <p>11 relationship with the attorneys for Beasley Allen in</p> <p>12 this litigation?</p> <p>13 A. Yes, they are.</p> <p>14 Q. How were they made aware of it?</p> <p>15 A. I made them aware of it.</p> <p>16 Q. When did you make them aware of it?</p> <p>17 A. When we started this whole thing.</p> <p>18 Q. What did you tell them?</p> <p>19 A. I tell them I'm acting as a -- what do you call it -- a</p> <p>20 witness expert in this litigation.</p> <p>21 Q. Did you -- have you told them that you've been</p> <p>22 designated to testify as an expert witness in this</p> <p>23 litigation?</p> <p>24 MS. O'DELL: Objection, asked and answered.</p> <p>25 THE WITNESS: I just said -- shared with them</p>
<p style="text-align: right;">Page 147</p> <p>1 witness in all the cases to the extent they are</p> <p>2 successful in using your article, correct?</p> <p>3 MS. O'DELL: Object to the form.</p> <p>4 THE WITNESS: So they can use whatever they</p> <p>5 want. This is my research and my lab. These are the</p> <p>6 results that I stand for.</p> <p>7 BY MR. HEGARTY:</p> <p>8 Q. Do you think they would pay you to testify in this</p> <p>9 litigation if your results were different in your</p> <p>10 article?</p> <p>11 MS. O'DELL: Object to the form.</p> <p>12 THE WITNESS: This work, negative results or</p> <p>13 positive results, both are results, so they're paying</p> <p>14 for my time to consult. Whether it's positive or</p> <p>15 negative to them doesn't matter.</p> <p>16 BY MR. HEGARTY:</p> <p>17 Q. Well, when you said you're acting as a consultant</p> <p>18 regarding this topic, what is this topic? Is it</p> <p>19 inflammation and cancer? Is it antioxidants? Is it</p> <p>20 talc? How is the reader supposed to know?</p> <p>21 MS. O'DELL: Object to the form.</p> <p>22 THE WITNESS: If you read -- the reader will</p> <p>23 read the title, which says Molecular Basis Supporting</p> <p>24 the Association of Talcum Powder Use With Increased</p> <p>25 Risk of Ovarian Cancer; very clear topic.</p>	<p style="text-align: right;">Page 149</p> <p>1 that I was selected to be an expert witness in this</p> <p>2 topic.</p> <p>3 BY MR. HEGARTY:</p> <p>4 Q. And you told them that before you started the</p> <p>5 experiments?</p> <p>6 A. About, yeah.</p> <p>7 Q. You are the senior author on this paper, correct?</p> <p>8 A. Correct.</p> <p>9 Q. Do you in any way supervise or do you in any way</p> <p>10 supervise any of the work of the other authors?</p> <p>11 A. All the work that is in this manuscript is done under</p> <p>12 my hundred percent supervision.</p> <p>13 Q. How about generally, do you supervise any of the other</p> <p>14 authors?</p> <p>15 A. I do.</p> <p>16 Q. Do they report to you?</p> <p>17 A. Yes.</p> <p>18 Q. Which ones report directly to you?</p> <p>19 A. So Nicole King, Ira, Amy, and that's about all the</p> <p>20 authors here.</p> <p>21 Q. Are you a resource for grant funding for things that</p> <p>22 they work on?</p> <p>23 MS. O'DELL: Object to the form.</p> <p>24 THE WITNESS: Am I a resource?</p> <p>25</p>

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<p>1 BY MR. HEGARTY: 2 Q. Yes. Do they work on studies that you have received 3 funding for? 4 A. No. 5 Q. Do they otherwise work for you -- let me strike that. 6 Do they work for you -- have they done work for you 7 outside of the work on this manuscript? 8 A. Some of them -- 9 MS. O'DELL: Object to form. 10 THE WITNESS: Some of them did. 11 BY MR. HEGARTY: 12 Q. Do some of them still work for you? 13 A. Yes. 14 Q. Which of the authors still work for you? 15 MS. O'DELL: Object to the form. 16 THE WITNESS: Work for me or work with me? 17 BY MR. HEGARTY: 18 Q. Work for you. 19 A. Work for me? 20 MS. O'DELL: Object to the form. 21 THE WITNESS: So what's work for me means? 22 I'm their supervisor? 23 BY MR. HEGARTY: 24 Q. Yes. 25 A. I'm paying their salary?</p>	<p>1 January 16, 2019. Do you see where it lists SAGE 2 Publications, underneath that Reproductive Sciences? 3 A. This here? 4 Q. Yes, at the top. SAGE and Reproductive Sciences. 5 A. Yes. 6 Q. Reproductive Sciences is a journal that has accepted 7 your article for publication, correct? 8 A. Yes. 9 Q. This exhibit identifies the editorial policies, peer 10 review policies, and other policies of this 11 publication. Are you familiar with all of these 12 policies? 13 MS. O'DELL: Object to the form. 14 THE WITNESS: Some. 15 BY MR. HEGARTY: 16 Q. Would you turn over to Page 5, sorry, Page 3 of 10. 17 Under the section Funding, it states that to comply 18 with the guidance for research funders, authors, and 19 publishers issued by the Research Information Network, 20 RS additionally requires all authors to acknowledge 21 their funding in a consistent fashion under a separate 22 heading. Do you see that? 23 A. Yes. 24 Q. Where in your acknowledgment do you acknowledge the 25 source of your funding?</p>
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<p>1 Q. You're their supervisor. Are you their supervisor? 2 A. Yes, I'm supervisor of Rong Fan, she is my research 3 technician or assistant. I am the Fellow Director for 4 the fellowship of Amy Harper. And let's see who's 5 here, Ira's no longer with us, she went to medical 6 school in New York. 7 Q. Do you prepare evaluations for -- have you prepared 8 evaluations for any of the authors on this paper? 9 A. Previously? 10 Q. Previously. 11 A. Nicole Fletcher. 12 Q. Any others? 13 A. Yearly evaluation because she was a post doc in my lab, 14 and this year I will prepare one for Rong. 15 Q. Reproductive Sciences is -- Reproductive Sciences is 16 published by SAGE Publications, correct? 17 A. I don't know, they keep, they switch different 18 publishers. 19 SAED DEPOSITION EXHIBIT NUMBER 12, 20 SAGE PUBLISHING DOCUMENT, 21 WAS MARKED BY THE REPORTER 22 FOR IDENTIFICATION 23 BY MR. HEGARTY: 24 Q. I'm going to mark as Exhibit Number 12 a printout from 25 the SAGE Publications website, it's printed out on</p>	<p>1 A. Okay, so this is -- this only applies to agencies that 2 require this. So, for example, I got NIH grant, I got 3 funding from NIH, I have to disclose funding from NIH. 4 If there is no funding, if it's internal funding, you 5 don't have to do that. 6 Q. Where does that standard -- where is that standard in 7 this document? 8 A. This is -- I have published in this journal for the 9 last 20 years. This is the protocol that we use. 10 Q. Can you cite for me any anything that came from SAGE 11 Publications saying that that's an appropriate reading 12 of the funding requirements? 13 MS. O'DELL: Object to the form. 14 THE WITNESS: I already told you we published 15 with SRI for several years, and my understanding that 16 if the agency, the funding agency requests that you 17 should add their name to the funding part of it, then 18 you should do that. If it's no funding -- departmental 19 is not considered funding, that's a burden actually, 20 it's not funding. 21 BY MR. HEGARTY: 22 Q. If you look under the section Declaration of 23 Conflicting Interests, you see the last paragraph of 24 that section before For More Information, it reads any 25 commercial or financial involvements that might</p>

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<p style="text-align: right;">Page 154</p> <p>1 represent an appearance of a conflict of interest need</p> <p>2 to be additionally disclosed in the covering letter</p> <p>3 accompanying your article to assist the editor in</p> <p>4 evaluating whether sufficient disclosure has been made</p> <p>5 within the Declaration of Conflicting Interests</p> <p>6 provided in the article. Do you see where I'm reading?</p> <p>7 A. Yes.</p> <p>8 Q. Did you provide such a cover letter to the editor of</p> <p>9 Reproductive Sciences identifying your consulting</p> <p>10 relationship with Beasley Allen?</p> <p>11 A. Okay, so when you go to the website Reproductive</p> <p>12 Sciences and you try to upload your manuscript to be</p> <p>13 considered for review on publication, there are forms</p> <p>14 that -- pages that you go through, and each page you</p> <p>15 have to answer the question before it allows you to</p> <p>16 proceed. So one of the pages was conflict of interest,</p> <p>17 and they, at that level they just want to know if you</p> <p>18 have a conflict of interest, you say "yes" or "no."</p> <p>19 And then later on in the manuscript you identify the</p> <p>20 conflict of interest if there is any.</p> <p>21 Q. When you were asked if you had a conflict of interest</p> <p>22 how did you respond?</p> <p>23 A. Yes.</p> <p>24 Q. Then you went to the next page that that would lead you</p> <p>25 to, and that's where you prepared --</p>	<p style="text-align: right;">Page 156</p> <p>1 A. If I did, yes.</p> <p>2 Q. If you sent a cover letter, do you recall if you</p> <p>3 provided information about the conflict of interest you</p> <p>4 disclosed in your paper or manuscript?</p> <p>5 MS. O'DELL: Object to the form.</p> <p>6 THE WITNESS: Yeah, if I provided the cover</p> <p>7 letter, will there be a conflict of interest in the</p> <p>8 cover letter?</p> <p>9 BY MR. HEGARTY:</p> <p>10 Q. Yes. Do you recall if you described the conflict of</p> <p>11 interest in your cover letter as required under the</p> <p>12 SAGE Publishing guidelines, Exhibit Number 12?</p> <p>13 MS. O'DELL: Objection to form.</p> <p>14 THE WITNESS: Yes, so in our practice I have</p> <p>15 been publishing with this particular journal and other</p> <p>16 journals, I never seen a cover letter saying that we</p> <p>17 have a conflict of interest. It's not a practice of</p> <p>18 talking to the editor and tell them that this is</p> <p>19 what --</p> <p>20 BY MR. HEGARTY:</p> <p>21 Q. In any of your prior publications have you ever</p> <p>22 disclosed a conflict of interest?</p> <p>23 A. Yes.</p> <p>24 Q. And do you recall an example of when you disclosed a</p> <p>25 conflict of interest?</p>
<p style="text-align: right;">Page 155</p> <p>1 A. Your manuscript.</p> <p>2 Q. -- the Acknowledgment Section, correct?</p> <p>3 A. No.</p> <p>4 Q. Sorry, the Conflict of Interest Section.</p> <p>5 A. No, no. Okay, so you write -- this is part of the</p> <p>6 format of the manuscript, the acknowledgment, the</p> <p>7 conflict of interest, that's the setup. Like how it</p> <p>8 says abstract, key words, introduction, methods, all</p> <p>9 that, this is part of the format, so this has to be in</p> <p>10 the manuscript, we upload to them.</p> <p>11 Q. What did you type in on that online form when you said</p> <p>12 yes to having a conflict of interest and then it</p> <p>13 directed you to another --</p> <p>14 A. There is no other form, they direct you to upload your</p> <p>15 manuscript. They accepted your yes answer, and then</p> <p>16 they allow you to proceed. If you don't answer, you</p> <p>17 are not allowed to proceed.</p> <p>18 Q. Exhibit Number 12 also says in the paragraph that I</p> <p>19 read to you that in addition to what you just</p> <p>20 described, that you need to include such a disclosure</p> <p>21 in the cover letter accompanying your article. First</p> <p>22 of all, did you send a cover letter with your article?</p> <p>23 A. I can't remember if it was required.</p> <p>24 Q. If you sent a cover letter, do you still have a copy of</p> <p>25 that cover letter?</p>	<p style="text-align: right;">Page 157</p> <p>1 A. When?</p> <p>2 Q. Yes. Do you recall an example of when you disclosed a</p> <p>3 conflict of interest?</p> <p>4 A. Every manuscript you submit you have to disclose a</p> <p>5 conflict of interest, whether it's yes or no, you have</p> <p>6 to.</p> <p>7 Q. Well, let me ask it a different way. Have you ever</p> <p>8 included a conflict of interest statement like the one</p> <p>9 in your manuscript in any prior publication of yours?</p> <p>10 A. Very rare, because I never consult -- I don't consult</p> <p>11 usually in this caliber, but colleagues, co-authors</p> <p>12 have done that, and there are co-authors in my</p> <p>13 publications. Everybody has to disclose.</p> <p>14 SAED DEPOSITION EXHIBIT NUMBER 13,</p> <p>15 SAGE PUBLISHING DOCUMENT,</p> <p>16 WAS MARKED BY THE REPORTER</p> <p>17 FOR IDENTIFICATION</p> <p>18 BY MR. HEGARTY:</p> <p>19 Q. We'll mark as Exhibit 13 another printout from the SAGE</p> <p>20 Publications website on the ethics and responsibility</p> <p>21 of authors. Would you look at Exhibit 13, Doctor.</p> <p>22 A. Yes.</p> <p>23 Q. Under the section Authors, it says authors should</p> <p>24 ensure that, and go down several bullet points where it</p> <p>25 reads any real or apparent conflicting or competing</p>

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<p style="text-align: right;">Page 158</p> <p>1 interest is clearly stated on submission of their</p> <p>2 paper. (This would include funding assistance). Do</p> <p>3 you see that?</p> <p>4 A. Where do you -- where is this --</p> <p>5 Q. It's the bullet point, second to last bullet point at</p> <p>6 the very bottom of the page.</p> <p>7 A. Yes.</p> <p>8 Q. So this is saying that any -- an author should ensure</p> <p>9 that any real or apparent conflicting or competing</p> <p>10 interest is clearly stated on submission of their</p> <p>11 paper. (This would include funding assistance). Do</p> <p>12 you see where I'm reading?</p> <p>13 A. Yes.</p> <p>14 Q. And is it your contention that you did that in this</p> <p>15 manuscript?</p> <p>16 A. I did.</p> <p>17 Q. You did not disclose in this manuscript that you</p> <p>18 received funding for this paper by attorneys in</p> <p>19 litigation, did you?</p> <p>20 A. I did, yes, I said consulting for a fee.</p> <p>21 Q. Where do you make reference to consulting for a fee in</p> <p>22 litigation?</p> <p>23 A. That's my --</p> <p>24 MS. O'DELL: Objection to form.</p> <p>25 THE WITNESS: That's my understanding.</p>	<p style="text-align: right;">Page 160</p> <p>1 The first paragraph of the letter makes</p> <p>2 reference to comments of the reviewers being included</p> <p>3 at the bottom of this letter, and we'll get to those</p> <p>4 comments, but you did receive comments back from</p> <p>5 reviewers of this article, correct?</p> <p>6 THE WITNESS: This is the only thing I</p> <p>7 received.</p> <p>8 BY MR. HEGARTY:</p> <p>9 Q. Did you eventually receive comments back from reviewers</p> <p>10 of the article?</p> <p>11 A. This is the only letter I received.</p> <p>12 Q. In addition to the letter, you did receive comments</p> <p>13 from authors of the -- I'm sorry -- from reviewers of</p> <p>14 the manuscript, correct?</p> <p>15 MS. O'DELL: Objection, asked and answered.</p> <p>16 THE WITNESS: Is this the whole --</p> <p>17 BY MR. HEGARTY:</p> <p>18 Q. Let me mark as Exhibit 14 --</p> <p>19 A. Is this the whole letter?</p> <p>20 MS. O'DELL: I think it's two pages.</p> <p>21 THE WITNESS: It's two pages? This is the</p> <p>22 whole e-mail?</p> <p>23</p> <p>24</p> <p>25</p>
<p style="text-align: right;">Page 159</p> <p>1 BY MR. HEGARTY:</p> <p>2 Q. You chose to use the words you set out in the Conflict</p> <p>3 of Interest Section, correct?</p> <p>4 A. Yes.</p> <p>5 Q. You agree that your relationship as a consultant does</p> <p>6 present a conflict of interest?</p> <p>7 MS. O'DELL: Object to the form.</p> <p>8 THE WITNESS: My relationship?</p> <p>9 BY MR. HEGARTY:</p> <p>10 Q. Yes, as a consultant does present a conflict of</p> <p>11 interest, which is why you included a Conflict of</p> <p>12 Interest Statement, correct?</p> <p>13 MS. O'DELL: Object to the form.</p> <p>14 THE WITNESS: We keep going back the same</p> <p>15 circles. What's the question?</p> <p>16 BY MR. HEGARTY:</p> <p>17 Q. You agree that your relationship with attorneys for</p> <p>18 Beasley Allen presents a conflict of interest that you</p> <p>19 needed to disclose?</p> <p>20 A. I disclosed that, yes.</p> <p>21 Q. If you would look at the letter on the very back page</p> <p>22 again of Exhibit Number 7.</p> <p>23 MS. O'DELL: Is the intent of the exhibit to</p> <p>24 include all of the communications or just this one?</p> <p>25 MR. HEGARTY: Start with this one.</p>	<p style="text-align: right;">Page 161</p> <p>1 SAED DEPOSITION EXHIBIT NUMBER 14,</p> <p>2 COPY OF LETTER FROM REPRODUCTIVE SCIENCES,</p> <p>3 WAS MARKED BY THE REPORTER</p> <p>4 FOR IDENTIFICATION</p> <p>5 BY MR. HEGARTY:</p> <p>6 Q. I'm going to mark as Exhibit 14 in addition to what we</p> <p>7 had received in connection with that manuscript, but</p> <p>8 this is the letter with the reviewer comments included.</p> <p>9 A. Yeah, this is all I received.</p> <p>10 Q. Is Exhibit Number 14 a copy of the letter with the</p> <p>11 reviewer comments at the end?</p> <p>12 A. Okay, this is all I received.</p> <p>13 Q. When you say this, you're talking about --</p> <p>14 A. The letter.</p> <p>15 Q. -- number 14?</p> <p>16 A. Yeah, the e-mail.</p> <p>17 Q. The next paragraph in that e-mail, the second paragraph</p> <p>18 says that the reviewers have recommended publication</p> <p>19 but also suggest some minor revisions to your</p> <p>20 manuscript. Therefore, I invite you to respond to the</p> <p>21 viewer's comments and revise your manuscript. Do you</p> <p>22 see where I'm reading?</p> <p>23 A. Yes.</p> <p>24 Q. Did you respond to the reviewer's comments?</p> <p>25 A. Yes.</p>

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<p>1 Q. Did you respond to reviewer's comments via e-mail?</p> <p>2 A. No, you can't do that.</p> <p>3 Q. How did you respond to viewer's comments?</p> <p>4 A. So you have to log in to Manuscript Central, you have</p> <p>5 to go to Revised Manuscript, and you have to include</p> <p>6 highlighted changes in the revised manuscript, and then</p> <p>7 you have to submit that to the reviewer one more time.</p> <p>8 Q. And did you do that in this case?</p> <p>9 A. Yes.</p> <p>10 Q. Do you still have a copy of the highlighted copy of the</p> <p>11 revisions that you submitted to the reviewers?</p> <p>12 A. Yes, and, also, it's in the website for the journal.</p> <p>13 Q. If you look down at Paragraph 6 of Exhibit 14, it reads</p> <p>14 when submitting your revised manuscript, you will be</p> <p>15 able to respond to the comments made by the reviewers</p> <p>16 in the space provided. So is there actually a space</p> <p>17 provided where you can actually communicate with the</p> <p>18 reviewers?</p> <p>19 A. (Witness shakes head from side to side.) You can't</p> <p>20 communicate with the reviewers.</p> <p>21 Q. Is there any way to respond?</p> <p>22 A. I don't know who they are, yes, you have to write your</p> <p>23 response but to the editor, not to the reviewer. I</p> <p>24 don't know who is the reviewer.</p> <p>25 Q. So did you write a response to the comments to the</p>	<p>1 A. I don't know, I don't know because they -- you write</p> <p>2 them, you write them in a space online, and they</p> <p>3 incorporate them into the manuscript if they agree with</p> <p>4 it, maybe disagree. So they send it to the reviewer,</p> <p>5 and the reviewer will decide, okay, I like this</p> <p>6 explanation, add it to the manuscript, or this</p> <p>7 explanation is already in the manuscript, which I</p> <p>8 recall I said to the reviewer, to the editor.</p> <p>9 Q. You recall saying to the editor that this -- as to this</p> <p>10 comment, it was already in the manuscript?</p> <p>11 A. Yes, I said this has been addressed in this section of</p> <p>12 manuscript; however, this is what we believe the</p> <p>13 molecular mechanism is all about. And he sent it to</p> <p>14 the reviewer, and the reviewer will say I agree, go</p> <p>15 ahead, accept, or I disagree, I think they should edit,</p> <p>16 or we don't like the whole comment.</p> <p>17 Q. Do you still have a copy of your response to this</p> <p>18 reviewer's comment?</p> <p>19 A. Again, this is done on the website.</p> <p>20 Q. Is that comment still on the website, to your</p> <p>21 knowledge?</p> <p>22 A. I don't know, but I can find it.</p> <p>23 Q. Well, what is the mechanism by which the ovary, and not</p> <p>24 the vagina, the cervix, or the endometrium are</p> <p>25 susceptible to talc effects, in your opinion?</p>
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<p>1 editor?</p> <p>2 A. Correct.</p> <p>3 Q. And do you still have a copy of that response?</p> <p>4 A. It's uploaded in the manuscript center, and I do have a</p> <p>5 copy, yes.</p> <p>6 Q. With regard to the reviewer comments, if you look at</p> <p>7 the second page of Exhibit 14, the first sentence under</p> <p>8 Comments and Suggestions, it reads what is the</p> <p>9 mechanism by which the ovary and not the vagina, the</p> <p>10 cervix, or the endometrium are susceptible to talc</p> <p>11 effects? Do you see where I'm reading?</p> <p>12 A. Yes, sorry.</p> <p>13 Q. Did you include any explanation in your revised</p> <p>14 manuscript to explain the mechanism by which the ovary</p> <p>15 and not the vagina and the cervix and the endometrium</p> <p>16 are susceptible talc effects?</p> <p>17 A. It was in the letter and response to the reviewer, to</p> <p>18 the editor, yes, it was in the form that you submit.</p> <p>19 Q. Did you revise your manuscript to include such a</p> <p>20 discussion about the mechanism by which the ovary and</p> <p>21 not the vagina, the cervix, or the endometrium are</p> <p>22 susceptible to talc effects?</p> <p>23 A. I believe I did, I added three sentences to clarify</p> <p>24 that.</p> <p>25 Q. Where in your manuscript are those three sentences?</p>	<p>1 A. So, in my opinion, that talcum powder, talcum particles</p> <p>2 go -- transfer, it's an open access for genital use.</p> <p>3 When they use it for genital use, it goes into the</p> <p>4 ovaries and incorporate into the tissues, and this</p> <p>5 continuously induce chronic inflammation that is linked</p> <p>6 strongly and actually the cause of ovarian cancer. Why</p> <p>7 other tissues don't get it, there are more than one</p> <p>8 explanation to that if you'd like to hear it.</p> <p>9 Q. Well, yeah, because I want to know what you believe to</p> <p>10 be the difference in the ovary versus the other organs.</p> <p>11 A. Yes. First, cancer is a tissue specific like cervical</p> <p>12 cancer, HPV so -- Second is the area in the uterus is</p> <p>13 full of secretion, and there is a dilution factor that</p> <p>14 kick everything out, whereas if it make it -- if the</p> <p>15 particles makes it to the ovaries, they sit there</p> <p>16 indefinitely.</p> <p>17 Q. Anything else?</p> <p>18 A. For now.</p> <p>19 Q. What about the -- you mentioned, though, the uterus.</p> <p>20 What about the vagina and cervix?</p> <p>21 A. What about --</p> <p>22 Q. Why is the ovary affected and not the vagina and</p> <p>23 cervix?</p> <p>24 A. Shall I repeat that, my answer?</p> <p>25 Q. Is it the same reason in your opinion?</p>

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<p style="text-align: right;">Page 166</p> <p>1 A. It's the wash, it's the dilution factor, it's the 2 excretion, it's always excretions, but ovaries are not. 3 Q. And is that opinion somewhere in Exhibit Number 7? You 4 said it already is in the section. In what section is 5 that concept? 6 A. So the peristaltic travel of the talcum particles into 7 the ovary has been actually discussed somewhere. 8 Q. That's over at the bottom of Page 8. Is that the 9 portion of the paper that you say already addresses 10 this comment? 11 A. Yes, part of it. 12 Q. Where else in the manuscript do you address this 13 comment by one of the reviewers? 14 A. I think this is sufficient, in my opinion, to show 15 evidence that there is a transfer of the particles from 16 the vagina and uterus area and fallopian tube into the 17 ovaries, that's substantial. 18 Q. The next comment reads what do the authors believe is 19 the determining factor for the increased sensitivity of 20 the epithelial ovarian cells to talc? You see where 21 I'm reading? 22 A. Where is that? Where is it? 23 Q. In the second comment that begins -- 24 A. Oh, the determining factor. 25 Q. What is -- the second comment is what do the authors</p>	<p style="text-align: right;">Page 168</p> <p>1 the epithelial ovarian cells to talc? 2 A. Chronic inflammation. 3 Q. And how is chronic inflammation -- or strike that -- 4 how are epithelial ovarian cells, how do they have 5 increased sensitivity to chronic inflammation? 6 A. So this is what actually made them in the first place. 7 It's the fact that they are exposed to continuously 8 over time with talcum particles, and that created a 9 chronic inflammation that actually transformed those 10 cells and caused the cells to go, the epithelial 11 ovarian cells to go cancerous with time. 12 Q. So, in your opinion, for purposes of your biologic 13 mechanism for talc causing ovarian cancer, talc must 14 reach the ovary, correct? 15 MS. O'DELL: Object to the form. 16 THE WITNESS: Not necessarily. 17 BY MR. HEGARTY: 18 Q. Well, the processes you just described all involve talc 19 reaching the ovary, correct? 20 A. No. I said any environment that create chronic 21 inflammation to the ovaries, epithelial ovarian cells, 22 normal ones, can or are known to develop this signature 23 of pro-oxidant state. We have published that in 24 several manuscripts. 25 Q. So, in your opinion, where must talc go to cause the</p>
<p style="text-align: right;">Page 167</p> <p>1 believe is the determining factor for the increased 2 sensitivity of the epithelial ovarian cells to talc? 3 How did you respond to that comment? 4 A. This is the core of the actual, the whole manuscript, 5 is about chronic inflammation and its link to ovarian 6 cancer. 7 Q. Did you revise your manuscript in response to this 8 reviewer comment? 9 A. Yes. 10 Q. How did you revise the transcript -- I'm sorry -- the 11 manuscript in response to this reviewer comment? 12 A. So we took the last part, we cut some words out, it 13 says wordy -- 14 Q. I'm not talking about that comment yet. 15 A. Which comment? 16 Q. The determining factor comment. 17 A. I told you, you don't need necessarily to agree with 18 the reviewer comment, you just put it in the -- there's 19 a box when you go online, and you just say we believe 20 that the manuscript is all about why ovarian cancer are 21 sensitive to inflammation. 22 Q. Is that how you responded to this reviewer comment? 23 A. Yes. 24 Q. So what is your opinion as to what you believe the 25 determining factor is for the increased sensitivity of</p>	<p style="text-align: right;">Page 169</p> <p>1 inflammation that you say can cause ovarian cancer? 2 MS. O'DELL: Objection to form. 3 THE WITNESS: Yeah, so I don't know, but what 4 I'm saying is the genital use of talcum powder expose 5 the genital tract, the reproductive tract to chronic 6 inflammation that, according to our 30 years of 7 studies, is linked and the cause of ovarian cancer. 8 BY MR. HEGARTY: 9 Q. Well, where in the genital tract must the chronic 10 inflammation occur to cause ovarian cancer? 11 A. If the environment is chronic and it has chronic 12 inflammation -- so preferred will be -- the first thing 13 will be actual contact, which would be in the ovaries, 14 second would be fallopian tube, and there are many 15 studies now indicating that the source of epithelial 16 ovarian cancer come from fallopian tube, and fallopian 17 tube is very close to the uterus and that close to the 18 cervix and vagina, so that's an open access in the 19 body. 20 Q. So you mentioned -- as far as where the chronic 21 inflammation must consider, you mentioned the ovary and 22 the fallopian tube. Is there any other organ in the 23 reproductive tract that you believe if it becomes 24 inflamed due to talc can lead to ovarian cancer? 25 MS. O'DELL: Object to the form.</p>

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<p style="text-align: right;">Page 170</p> <p>1 THE WITNESS: Yeah, I -- no, I understood 2 your question, but I disagree, that's not what I said. 3 BY MR. HEGARTY: 4 Q. What did you say? 5 A. No. So what I said is the use of talcum powder allows 6 talcum particles, according to our research, we added 7 the particles to the cells, the cells showed 8 inflammatory response. So we expect if the talcum 9 powder enter the genital area, go to -- and I said I, 10 you know, organized them for you, so the most effect 11 will be if they are in the ovary, and we already have 12 evidence, and not just us, every -- all the world know 13 now, that acute inflammation does not cause cancer, is 14 not linked to cancer, it may initiate cancer, but 15 chronic inflammation is the real trigger for cancer in 16 general and ovarian cancer. And we have shown that all 17 these redox balance is altered in ovarian cancer cells. 18 So the first impact, the highest impact will be if the 19 particle is in the ovary, and this has been reported by 20 some people, and the second or less degree, less impact 21 or longer time, maybe it's the same impact but it's a 22 longer time probably, all this need to be further 23 studied, is in the fallopian tube, and then who knows 24 what it does to uterus and cervical area. 25 Q. Well, I thought you said when you responded to the</p>	<p style="text-align: right;">Page 172</p> <p>1 cancer risk? 2 Q. Question is very specific. Can you cite for me any 3 published literature reporting finding chronic 4 inflammation in the presence of talc in the fallopian 5 tubes or ovaries or the endometrium in women using 6 talc? 7 MS. O'DELL: Objection to the form. 8 Epidemiological studies is what the doctor asked you to 9 clarify. Is that what you meant? 10 THE WITNESS: Do you -- 11 BY MR. HEGARTY: 12 Q. I don't think -- I'm not talking about epidemiologic 13 studies. I'm talking about can you cite for me any 14 studies that report finding inflamed tissue in the 15 presence of talc in women using talc on the perineum? 16 MS. O'DELL: Object to the form. 17 THE WITNESS: So your question is any 18 manuscript, any papers, any papers that cite or discuss 19 the presence of inflamed tissues in response to woman 20 using talcum powder. 21 BY MR. HEGARTY: 22 Q. Correct. 23 A. And my answer to you is I don't know any references. 24 What I do know, that there are lots of epidemiological 25 studies that link woman who uses talcum powder are at</p>
<p style="text-align: right;">Page 171</p> <p>1 question, the comment that said the mechanism which the 2 ovary and not the vagina, the cervix, or the 3 endometrium are susceptible, that this washing keeps 4 those organs from being susceptible. So the 5 endometrium is in the uterus, correct? 6 MS. O'DELL: Object to the form. 7 THE WITNESS: Okay. So the question here 8 they are asking about mechanisms in the ovaries, so 9 that's what I responded to. 10 BY MR. HEGARTY: 11 Q. Well, do you consider the endometrium to be a 12 susceptible organ to talc in the sense that it can 13 cause inflammation that can lead to ovarian cancer? 14 A. Probably. 15 Q. Can you cite for me any published scientific or medical 16 article reporting inflammation of the ovaries or 17 inflammation of the fallopian tubes or the endometrium 18 in women using talc? 19 MS. O'DELL: Object to the form. 20 THE WITNESS: So can I report articles for 21 you? 22 BY MR. HEGARTY: 23 Q. Yes. 24 A. There are -- are you talking about gynecological 25 studies that link the use of -- in women to ovarian</p>	<p style="text-align: right;">Page 173</p> <p>1 increased risk of developing ovarian cancer. That is 2 in the literature everywhere. There are some few 3 molecular work also indicating that this also can cause 4 inflammation, oxidative stress, it's out in there. 5 There are some other molecular works that also shows 6 that there is actually gene expression differential, 7 gene expression in exposure to talc, and this is 8 really -- I mean this powder, this particle cause 9 biological changes to the cell, so I am not surprised 10 if it does the same inside the genital tract. 11 Q. The next comment in Exhibit Number 14 says the 12 manuscript is wordy and would benefit from an attentive 13 reduction, do you see that? 14 A. I did. 15 Q. How did you respond to that comment? 16 A. I agreed, and I shaped some words unnecessary 17 references that we have established methodology that we 18 don't need to do, to have. 19 SAED DEPOSITION EXHIBIT NUMBER 15, 20 JANUARY 14, 2019 E-MAIL, 21 WAS MARKED BY THE REPORTER 22 FOR IDENTIFICATION 23 BY MR. HEGARTY: 24 Q. I want to next mark as Exhibit 15 another reviewer 25 comment that we were provided. Do you recognize</p>

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<p>1 Exhibit 15?</p> <p>2 A. This is an e-mail from the editor.</p> <p>3 Q. Yes.</p> <p>4 A. Yes, saying that they accepted the manuscript.</p> <p>5 Q. This is dated January 14, 2019, correct?</p> <p>6 A. Okay.</p> <p>7 Q. Is that right?</p> <p>8 A. Yes, it says so.</p> <p>9 Q. Then again it -- strike that. Below it says Reviewer:</p> <p>10 1, correct?</p> <p>11 A. Yes.</p> <p>12 Q. Comments to the author. Well done.</p> <p>13 A. Yes.</p> <p>14 Q. Was there only one reviewer for purposes of your paper?</p> <p>15 A. Yes, Reviewer: 1.</p> <p>16 Q. In what I marked as Exhibit Number 15 is Reviewer 1's</p> <p>17 comment after you made changes to your paper?</p> <p>18 A. Correct.</p> <p>19 Q. So the peer review for this article had one reviewer,</p> <p>20 correct?</p> <p>21 A. No, I don't know.</p> <p>22 Q. Did you get comments back from any other reviewer?</p> <p>23 A. I review comments, I review manuscripts for many</p> <p>24 journals. If you have no comments or if you have good</p> <p>25 comments, I don't need to show them.</p>	<p>1 BY MR. HEGARTY:</p> <p>2 Q. I'm going to mark as Exhibit Number 16 a copy of the</p> <p>3 expert report for you we were provided in this case.</p> <p>4 Is Exhibit Number 16 your expert report in this case?</p> <p>5 A. Yes.</p> <p>6 Q. There are large portions of the manuscript that are</p> <p>7 identical to your report, correct?</p> <p>8 A. I don't know about large, but based on it, yes.</p> <p>9 Q. Which was prepared first, the manuscript or the report?</p> <p>10 A. This is November, and the manuscript was September, so</p> <p>11 the manuscript was first.</p> <p>12 Q. Did you conduct the experiments that are described in</p> <p>13 the manuscript for Beasley Allen?</p> <p>14 A. Say that again, please.</p> <p>15 Q. Did you conduct the experiments that are in the</p> <p>16 manuscript for Beasley Allen?</p> <p>17 MS. O'DELL: Object to the form.</p> <p>18 THE WITNESS: The experiment I did, I did it</p> <p>19 in my lab for me.</p> <p>20 BY MR. HEGARTY:</p> <p>21 Q. Was the work that you did on -- in conducting the</p> <p>22 experiments and doing the manuscript independent of</p> <p>23 Beasley Allen or any counsel for Plaintiffs?</p> <p>24 MS. O'DELL: Object to the form.</p> <p>25 THE WITNESS: The work that I did in the lab,</p>
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<p>1 Q. Do you know how many reviewers --</p> <p>2 A. No knowledge.</p> <p>3 Q. Let me finish -- do you know how many reviewers</p> <p>4 Reproductive Sciences had for your manuscript?</p> <p>5 A. No.</p> <p>6 MR. HEGARTY: Let's go off the record real</p> <p>7 quick. I need to take just a quick break and we'll be</p> <p>8 right back.</p> <p>9 THE VIDEOGRAPHER: Going off the record at</p> <p>10 2:23 p.m.</p> <p>11 (A short recess was taken.)</p> <p>12 THE VIDEOGRAPHER: We're back on the record</p> <p>13 at 2:28 p.m.</p> <p>14 BY MR. HEGARTY:</p> <p>15 Q. Dr. Saed, are there any other communications between</p> <p>16 you and the editors of Reproductive Sciences that we've</p> <p>17 not talked about today?</p> <p>18 A. Not that I'm aware of.</p> <p>19 Q. Do you know when your article is supposed to be</p> <p>20 published?</p> <p>21 A. I don't know.</p> <p>22 SAED DEPOSITION EXHIBIT NUMBER 16,</p> <p>23 EXPERT REPORT,</p> <p>24 WAS MARKED BY THE REPORTER</p> <p>25 FOR IDENTIFICATION</p>	<p>1 no one has any interference in how it's designed, what</p> <p>2 the method should be used, how to analyze the data, how</p> <p>3 to write the manuscript, all that is all mine.</p> <p>4 UNIDENTIFIED ATTORNEY: Objection,</p> <p>5 nonresponsive.</p> <p>6 BY MR. HEGARTY:</p> <p>7 Q. Going back to my question, was the experiment you</p> <p>8 conducted and the manuscript that you wrote independent</p> <p>9 of your work with Beasley Allen in this litigation?</p> <p>10 MS. O'DELL: Objection to the form.</p> <p>11 THE WITNESS: So I was paid for my time as a</p> <p>12 consultant, but this work was funded by my lab.</p> <p>13 BY MR. HEGARTY:</p> <p>14 Q. But going back to the experiments that you did and the</p> <p>15 manuscript that you wrote, were those separate -- was</p> <p>16 that a separate piece of work than what you're doing</p> <p>17 with Beasley Allen?</p> <p>18 MS. O'DELL: Object to the form, asked and</p> <p>19 answered.</p> <p>20 THE WITNESS: Separate means -- what do you</p> <p>21 mean by separate?</p> <p>22 BY MR. HEGARTY:</p> <p>23 Q. Separate means unrelated.</p> <p>24 MS. O'DELL: Object to the form.</p> <p>25 THE WITNESS: Yeah, we're -- I'm hired as a</p>

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<p>1 witness expert in talc, ovarian cancer and oxidative</p> <p>2 stress, and I am doing work in my lab related to the</p> <p>3 consulting that what I'm doing with Beasley Allen.</p> <p>4 BY MR. HEGARTY:</p> <p>5 Q. So was the work that you did in doing the tests and</p> <p>6 preparing the manuscript independent of your</p> <p>7 relationship with Beasley Allen?</p> <p>8 MS. O'DELL: Objection, asked and answered.</p> <p>9 THE WITNESS: I still don't understand the</p> <p>10 independent type.</p> <p>11 BY MR. HEGARTY:</p> <p>12 Q. Well, was it done --</p> <p>13 A. Can you reformat the question, please.</p> <p>14 Q. Well, was that work separate and unrelated to your work</p> <p>15 with Beasley Allen?</p> <p>16 MS. O'DELL: Object to the form.</p> <p>17 THE WITNESS: It was separate, not -- it is</p> <p>18 related, so I don't know about what separate means, but</p> <p>19 it is related, yes, but in what caliber it's related,</p> <p>20 that's what I want to emphasize. They have no saying</p> <p>21 in any of the work that has been done here.</p> <p>22 BY MR. HEGARTY:</p> <p>23 Q. Would you have done this same work if you were not a</p> <p>24 consultant for Beasley Allen?</p> <p>25 MS. O'DELL: Object to the form.</p>	<p>1 A. Because the whole news and the whole media is all about</p> <p>2 Johnson & Johnson product.</p> <p>3 Q. Did you choose Johnson's Baby Powder because that</p> <p>4 product is in this litigation?</p> <p>5 A. Not in this litigation, but for me, because of the</p> <p>6 media and all these reports that I've been reading and</p> <p>7 the association of woman using Johnson & Johnson Baby</p> <p>8 Powder with increased risk of ovarian cancer.</p> <p>9 Q. Within your lab notebooks, where are the tests that you</p> <p>10 conducted with Fisher Scientific talcum powder?</p> <p>11 A. I can show it to you.</p> <p>12 Q. Okay. You're looking at Exhibit Number 2, the lab</p> <p>13 notebook for the experiments reflected in your --</p> <p>14 MS. O'DELL: I think it's Exhibit 3.</p> <p>15 THE WITNESS: That's Fisher.</p> <p>16 BY MR. HEGARTY:</p> <p>17 Q. I'm sorry. So Exhibit Number 3, which is the lab</p> <p>18 notebook for the pilot study involved Fisher --</p> <p>19 A. Correct.</p> <p>20 Q. -- talc?</p> <p>21 A. Talc.</p> <p>22 Q. The only talc tested as reflected in Exhibit Number 2</p> <p>23 is Johnson & Johnson, Johnson's Baby Powder?</p> <p>24 A. This one here, initially we used both, and then we</p> <p>25 stopped using Fisher and we continued using Johnson &</p>
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<p>1 THE WITNESS: I would have done the same type</p> <p>2 of rigorous testing because this is my primary focus of</p> <p>3 my laboratory, and anything that is related to</p> <p>4 inflammation, oxidative stress, and ovarian cancer, it</p> <p>5 is what we like to do in our lab.</p> <p>6 BY MR. HEGARTY:</p> <p>7 Q. Your experiments involved Johnson's Baby Powder,</p> <p>8 correct?</p> <p>9 A. Correct.</p> <p>10 Q. Where did you purchase the Johnson's Baby Powder that</p> <p>11 you used?</p> <p>12 A. Walgreen across the street.</p> <p>13 Q. Why did you choose to use Johnson's Baby Powder in your</p> <p>14 experiment?</p> <p>15 A. Because I want to see if the use of baby powder, talcum</p> <p>16 powder, has any biological effect on ovarian cancer</p> <p>17 cells.</p> <p>18 Q. Why did you choose the Johnson's Baby Powder brand?</p> <p>19 A. I chose Johnson & Johnson baby powder and I chose</p> <p>20 Fisher.</p> <p>21 Q. Why did you choose the Johnson Baby Powder brand versus</p> <p>22 another brand of talcum powder product?</p> <p>23 A. I chose Fisher.</p> <p>24 Q. Why did you choose Johnson's Baby Powder over another</p> <p>25 commercially available baby powder?</p>	<p>1 Johnson.</p> <p>2 Q. Is there any reference in -- to testing Fisher talcum</p> <p>3 powder in Exhibit Number 2?</p> <p>4 A. I can't remember.</p> <p>5 Q. Well, the first page of your -- strike that.</p> <p>6 MS. O'DELL: Just for the record, can we note</p> <p>7 the page it's turned to in Exhibit 3, what page is</p> <p>8 that, in the lab notebook?</p> <p>9 THE WITNESS: Okay.</p> <p>10 MS. O'DELL: What page is it turned to?</p> <p>11 MR. HEGARTY: It's now on Pages 38 and 39.</p> <p>12 MS. O'DELL: Okay.</p> <p>13 BY MR. HEGARTY:</p> <p>14 Q. If you look at Page 5 of your manuscript.</p> <p>15 A. Methodology?</p> <p>16 Q. Not of your report, your manuscript, that's Exhibit 7.</p> <p>17 A. Page 5.</p> <p>18 Q. Page 5.</p> <p>19 A. Okay.</p> <p>20 Q. At the top you say Treatment of cells. Talcum powder</p> <p>21 (Fisher Scientific, Catalog #T4-500, Lot#166820) or</p> <p>22 baby powder, then referencing Johnson & Johnson, was</p> <p>23 dissolved in DMSO, et cetera. Do you see where I'm</p> <p>24 reading?</p> <p>25 A. Yes.</p>

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<p>1 Q. Where in your manuscript do you report the results from</p> <p>2 your tests done on Fisher Scientific talcum powder?</p> <p>3 A. We didn't. This is for the previous abstracts that we</p> <p>4 used which is this.</p> <p>5 Q. So none of the data reported in your manuscript was</p> <p>6 data from experiments involving Fisher Scientific</p> <p>7 talcum powder?</p> <p>8 A. In this manuscript, all the data here, as far as I</p> <p>9 remember, they're all done with Johnson & Johnson.</p> <p>10 Q. Did you run the exact same tests that you report in</p> <p>11 your manuscript with Fisher Scientific talcum powder?</p> <p>12 A. No, we only did this with Fisher, which is PCR.</p> <p>13 MS. O'DELL: And what are you pointing to,</p> <p>14 Doctor, just so the record --</p> <p>15 THE WITNESS: Which is the preliminary</p> <p>16 studies that we used to publish for our SRI abstract</p> <p>17 which was presented March of 2018. There was only one</p> <p>18 component, which is PCR, and some few fact -- and some</p> <p>19 few markers. This is -- this was not an extensive and</p> <p>20 comprehensive study as the one described here. This is</p> <p>21 just preliminary to show there is an effect or there is</p> <p>22 no effect.</p> <p>23 BY MR. HEGARTY:</p> <p>24 Q. What prooxidant or anti-oxidant --</p> <p>25 MS. O'DELL: It's confusing because you're</p>	<p>1 Powder?</p> <p>2 A. Okay. So I'm now referring to this, what's this --</p> <p>3 Q. Exhibit 2.</p> <p>4 A. Exhibit 2 and I did --</p> <p>5 MS. O'DELL: Page --</p> <p>6 THE WITNESS: Here sections PCR, I did ELISA.</p> <p>7 MS. O'DELL: What page does ELISA begin on?</p> <p>8 THE WITNESS: 53.</p> <p>9 MS. O'DELL: Okay.</p> <p>10 THE WITNESS: I did -- all labeled here what</p> <p>11 we did. SNP analysis --</p> <p>12 MS. O'DELL: What page? Starts --</p> <p>13 THE WITNESS: 102.</p> <p>14 MS. O'DELL: Okay.</p> <p>15 THE WITNESS: I did MTT.</p> <p>16 MS. O'DELL: What page?</p> <p>17 THE WITNESS: 106. And statistics final. So</p> <p>18 that's all done with J & J Baby Powder.</p> <p>19 BY MR. HEGARTY:</p> <p>20 Q. Does Exhibit Number 3 contain all the data of your PCR</p> <p>21 tests for Fisher Scientific talcum powder?</p> <p>22 A. Sorry, one more time, please.</p> <p>23 Q. Does Exhibit Number 3 contain all of the data of your</p> <p>24 PCR tests for Fisher Scientific talcum powder?</p> <p>25 A. That we reported this abstract at SRI, yes.</p>
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<p>1 saying this, but you're referring to Exhibit 3, the</p> <p>2 study in Exhibit 3.</p> <p>3 THE WITNESS: This is Exhibit 3?</p> <p>4 MS. O'DELL: Yes.</p> <p>5 MR. FINDEIS: Which page of the exhibit?</p> <p>6 THE WITNESS: 3 is --</p> <p>7 MR. FINDEIS: It's open to which page --</p> <p>8 THE WITNESS: So this is Exhibit 3, Page 38</p> <p>9 onward.</p> <p>10 BY MR. HEGARTY:</p> <p>11 Q. Which pro-oxidant and anti-oxidant enzyme did you look</p> <p>12 at involving Fisher Scientific talcum powder?</p> <p>13 A. So they are all listed here. I'll tell you in one</p> <p>14 second. Catalase.</p> <p>15 MS. O'DELL: What page?</p> <p>16 THE WITNESS: Page 47, catalase GSR, GPX,</p> <p>17 GST, MPO, nitric oxide, SOD3.</p> <p>18 BY MR. HEGARTY:</p> <p>19 Q. And you say you only ran --</p> <p>20 A. PCR.</p> <p>21 Q. And what test did you do beyond PCR with Johnson's Baby</p> <p>22 Powder?</p> <p>23 A. Sorry, I just want to make sure that they're all here,</p> <p>24 okay. So, sorry, what's the question?</p> <p>25 Q. What tests did you do besides PCR with Johnson's Baby</p>	<p>1 Q. In your manuscript you report the enzyme data after 72</p> <p>2 hours.</p> <p>3 A. Enzyme?</p> <p>4 Q. I'm sorry, the protein data after 72 hours.</p> <p>5 A. No, I didn't.</p> <p>6 Q. What did you report after 72 hours?</p> <p>7 A. The effect of treatment after 72 hours. That's totally</p> <p>8 different.</p> <p>9 Q. Why did you choose 72 hours?</p> <p>10 A. It was from a previous paper, one of those two, 72</p> <p>11 hours, they did 48 hours, 72 hours, and I picked 72</p> <p>12 because there is data showing very similar, I can't</p> <p>13 remember the reference of it.</p> <p>14 Q. In your report you describe the results of your tests</p> <p>15 only up to 48 hours, correct?</p> <p>16 A. Where is it, my report --</p> <p>17 Q. Over on Page 14.</p> <p>18 A. Page 14.</p> <p>19 Q. In the section Treatment of Cells.</p> <p>20 A. Where does it say that? Here? Treatment of cells.</p> <p>21 Yeah, this is not accurate, 72 hours, this is a typo.</p> <p>22 Q. So you're saying that the reference to 48 hours in</p> <p>23 Exhibit Number -- what is that marked as, your report?</p> <p>24 MS. O'DELL: 16.</p> <p>25 BY MR. HEGARTY:</p>

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<p style="text-align: right;">Page 186</p> <p>1 Q. 16, so you're saying that the reference to 48 hours in 2 Exhibit Number 16 is incorrect and it should be 72 3 hours? 4 A. Correct, because we did all the work with 72 hours. 5 Q. Did you try other durations that are not reported in 6 your report or manuscript? 7 A. No. 8 Q. At the bottom of Page 8 of your manuscript, Exhibit 7. 9 A. Exhibit 7, that's Exhibit 8, oh, I have two, two 10 manuscripts. 11 Q. 7 and 8 are identical. 12 A. Okay. 13 Q. Bottom of Page 7. 14 A. Page 7. 15 Q. You made reference to this before to citing to 16 something called the peristaltic pump; do you see that? 17 A. Page 7. 18 Q. Page 8. 19 A. Oh, sorry, Page 8, I heard 7, sorry. The last 20 sentence. 21 Q. Yes, second to the last line. 22 A. Feature of uterus, yes. 23 Q. That reference is not in your expert report. 24 A. This is my paper, okay. So let's see. 25 Q. Right, but my question is that the reference to the</p>	<p style="text-align: right;">Page 188</p> <p>1 part of your manuscript to 8 through 10. Did counsel 2 for Beasley Allen provide those references to you? 3 A. Absolutely not. 4 Q. So is it your testimony that you came up with -- that 5 you decided on your own to make reference to the 6 peristaltic pump in your manuscript? 7 A. This is not I decide on my own. This is like a 8 collective reading of my reading throughout the whole 9 literature. It's not just -- so the hypothesis that we 10 have been trying to address for the last 30 years of my 11 lab is how -- what's the trigger, what's the initiator 12 for ovarian cancer, and there are many hypotheses out 13 there, and one of the hypotheses is that something come 14 through the genital tract. 15 Q. If you turn to Page 9 in your manuscript, you in the 16 first sentence of the second paragraph, you say in this 17 study, we have shown beyond doubt that talc alters key 18 redox and inflammatory markers, et cetera. Do you see 19 what I'm reading? 20 A. Yes. 21 Q. Have you ever used the phrase "beyond doubt" before in 22 any published article of yours? 23 A. I believe I did. 24 Q. Can you cite for me one where you use that phrase? 25 A. Not now.</p>
<p style="text-align: right;">Page 187</p> <p>1 peristaltic pump is nowhere in Exhibit Number 16, your 2 expert report. Why did you not include that in your 3 expert report? 4 A. Is it not included? I don't know, I trust you. 5 MS. O'DELL: Take a look. 6 THE WITNESS: Let me take a look. So Number 7 8 is -- this is the manuscript, where are the 8 references? So do I have the references here? 9 BY MR. HEGARTY: 10 Q. I'll represent, Doctor, that it's not in there. Do you 11 recall when you came across a reference to this phrase 12 the peristaltic pump? 13 MS. O'DELL: Objection to the form. 14 THE WITNESS: Okay, sorry. 15 BY MR. HEGARTY: 16 Q. Yes, you do you recall when in the writing process for 17 your manuscript you came across a reference to this 18 thing called a peristaltic pump? 19 MS. O'DELL: Objection to form. 20 THE WITNESS: If I recall where I read this 21 manuscript, this reference? 22 BY MR. HEGARTY: 23 Q. Yes, and when. 24 A. No, I don't remember. 25 Q. Were you -- strike that. You made references at that</p>	<p style="text-align: right;">Page 189</p> <p>1 Q. It's true, though, that whatever you found and reported 2 in your article was under the conditions of your 3 experiment, correct? 4 MS. O'DELL: Object to the form. 5 THE WITNESS: Can you -- 6 BY MR. HEGARTY: 7 Q. Everything you describe in this manuscript occurred 8 under the conditions of your experiments, correct? 9 MS. O'DELL: Object to the form. 10 THE WITNESS: So occurred means -- okay, so 11 my response to this, all the experiments that has been 12 performed here, they were performed according to the 13 standard protocols that we have extensively published 14 with. 15 BY MR. HEGARTY: 16 Q. The statement that you make there is based on the 17 results of your cell studies, correct? 18 A. My cell studies, yes. 19 Q. It's not based on any data from in vivo studies, 20 correct? 21 MS. O'DELL: Objection, form. 22 THE WITNESS: There is no need. 23 BY MR. HEGARTY: 24 Q. That's not my question. My question is those 25 statements are not based on any in vivo data, correct?</p>

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<p>1 MS. O'DELL: Object to the form.</p> <p>2 THE WITNESS: So those, again, those results,</p> <p>3 the result, no, this is -- this is what we have shown</p> <p>4 in this manuscript, that's not my opinion of the whole</p> <p>5 situation. So this -- the basis of the sentence is --</p> <p>6 came from the results, the experiments that we did that</p> <p>7 we described here.</p> <p>8 BY MR. HEGARTY:</p> <p>9 Q. Those results have not been shown in any in vivo</p> <p>10 situation, whether it's human or animal, correct?</p> <p>11 MS. O'DELL: Object to the form.</p> <p>12 THE WITNESS: Similar outcome have been shown</p> <p>13 in -- before, yes.</p> <p>14 BY MR. HEGARTY:</p> <p>15 Q. Well, cite for me the published articles reporting the</p> <p>16 same results that you got in an in vivo model.</p> <p>17 MS. O'DELL: Objection, form.</p> <p>18 THE WITNESS: There was no any in vivo</p> <p>19 studies done at the molecular level. This is -- my</p> <p>20 study was the first comprehensive study that actually</p> <p>21 does that.</p> <p>22 BY MR. HEGARTY:</p> <p>23 Q. What you found was in cell cultures.</p> <p>24 A. These are ovarian cancer cells from patients.</p> <p>25 Q. These are not ovarian cancer cells -- these are not</p>	<p>1 BY MR. HEGARTY:</p> <p>2 Q. What published literature reports finding the same</p> <p>3 things you report in this study in an animal model?</p> <p>4 A. Not the same things, similar things.</p> <p>5 Q. I'm asking --</p> <p>6 A. Same exact?</p> <p>7 Q. I'm asking can you cite for me any published literature</p> <p>8 reporting the same findings that you report in this</p> <p>9 article in an in vivo model?</p> <p>10 MS. O'DELL: Object to the form.</p> <p>11 THE WITNESS: Again, I repeat the same thing,</p> <p>12 I say I have seen work that has been done in vivo using</p> <p>13 animals, different type of animals, that show an</p> <p>14 association of talcum powder to increased risk of</p> <p>15 ovarian cancer. My work that has been done here in</p> <p>16 cell lines is not many laboratory have done this in</p> <p>17 ovarian cancer because this is our specialty, this is</p> <p>18 what we do. So we don't have -- part of it is done</p> <p>19 probably like oxidative stress as collective like, for</p> <p>20 example, some manuscripts, they measure hydrogen</p> <p>21 peroxide as a marker of oxidative stress, so for</p> <p>22 experts in oxidative stress, you need to do more than</p> <p>23 just that. So I have seen in animals where there are</p> <p>24 some biological effects in vivo.</p> <p>25</p>
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<p>1 normal ovarian cancer cells, correct?</p> <p>2 A. Some are, yes.</p> <p>3 Q. Well, they've been immortalized, correct?</p> <p>4 A. The normal variance they have been immortalized.</p> <p>5 They're sold as such.</p> <p>6 Q. The data that you report in your manuscript has never</p> <p>7 been reported in an in vivo situation, correct?</p> <p>8 MS. O'DELL: Object to the form.</p> <p>9 THE WITNESS: So, again, using -- I have seen</p> <p>10 reports in vivo in animals that have shown the</p> <p>11 association of the talc with inflammation, yes.</p> <p>12 BY MR. HEGARTY:</p> <p>13 Q. I'm talking about the very results that you report in</p> <p>14 your study --</p> <p>15 A. I don't think anybody did them.</p> <p>16 MS. O'DELL: Let him finish.</p> <p>17 MR. HEGARTY: Let me finish the question.</p> <p>18 MS. O'DELL: Let me object.</p> <p>19 BY MR. HEGARTY:</p> <p>20 Q. You cannot cite to any published literature showing the</p> <p>21 same results that you found in your cell studies in any</p> <p>22 in vivo model, animal or human, correct?</p> <p>23 MS. O'DELL: Object to the form.</p> <p>24 THE WITNESS: I have seen in animals, yes.</p> <p>25</p>	<p>1 BY MR. HEGARTY:</p> <p>2 Q. I'm talking about the biological effects you report in</p> <p>3 your manuscript.</p> <p>4 A. Which include some of this.</p> <p>5 Q. What literature can you cite for me that has shown</p> <p>6 these same biological effects in an in vivo model?</p> <p>7 MS. O'DELL: Object to the form.</p> <p>8 BY MR. HEGARTY:</p> <p>9 Q. The same biological effects you report in your</p> <p>10 manuscript.</p> <p>11 MS. O'DELL: Object to the form, asked and</p> <p>12 answered.</p> <p>13 THE WITNESS: I guess I'm not understanding</p> <p>14 the question because, again, these are cell lines from</p> <p>15 ovarian cancer patients, and doing work with cell lines</p> <p>16 is the closest you can get to in vivo. If there is</p> <p>17 work that has been done to depict all the work I have</p> <p>18 done here, this is none, to my knowledge, but there are</p> <p>19 reports that clearly indicates an in vivo effect.</p> <p>20 BY MR. HEGARTY:</p> <p>21 Q. What reports are you referring to?</p> <p>22 A. Animal studies.</p> <p>23 Q. Cite for me the author or name of the animal studies</p> <p>24 you're referring to.</p> <p>25 MR. DONATH: Move to strike, nonresponsive.</p>

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<p style="text-align: right;">Page 194</p> <p>1 THE WITNESS: So, yeah, I think I referenced 2 some animal studies work here. Let's see. This is the 3 manuscript? I'm trying to find references. Yes. 4 Where is that paper? I can't remember this. I know 5 it's in the report. Yeah, it's right here, sorry. I 6 know I referenced it here. 7 BY MR. HEGARTY: 8 Q. How much more time do you need, Doctor? 9 A. It's been a while, so I need to find out exactly where 10 this is, but I know it's here. So it is some cited in 11 reference 50, but that's not the author -- that's not 12 the original reference, this is a cross-reference. 13 Q. You said cited in 50? 14 A. Number 50, but that's a cross-reference, if I recall 15 correctly. 16 Q. You need more time? 17 A. I do. I'm trying to look for it. 18 Q. Let's go off the record. 19 THE VIDEOGRAPHER: Going off the record at 20 2:57 p.m. 21 (An off-the-record discussion was held.) 22 THE VIDEOGRAPHER: Back on the record at 2:59 23 p.m. 24 BY MR. HEGARTY: 25 Q. Doctor, when we went off the record momentarily you</p>	<p style="text-align: right;">Page 196</p> <p>1 rats and mice, not the ovaries, correct? 2 A. No, it was summarize a review of everything, the actual 3 study, yes. 4 Q. The NTP didn't look at ovarian cancer, correct? 5 A. I'm not sure. I read from that study that they have 6 summary, summary, and somewhere there I read that there 7 was in vivo association of the talcum powder use with 8 ovarian cancer. So that's called reference reference. 9 Q. Your report -- 10 A. May I add something? I also read it somewhere else, I 11 cannot remember right now. 12 Q. Your report in your manuscript say that you in your 13 experiments found genotype switches at 72 hours; is 14 that correct? 15 A. Genotype switches, what are you referring to? 16 MS. O'DELL: What page? 17 BY MR. HEGARTY: 18 Q. You report in your manuscript. 19 A. Which particular -- 20 Q. Well, let me ask you about your manuscript. Did your 21 manuscript report genotype switches at 72 hours? 22 A. The effect of talcum 72 hours induced SNP in genetic 23 mutations. 24 Q. And do you claim that those genetic mutations occurred 25 in all cells treated with talc, in your experiments?</p>
<p style="text-align: right;">Page 195</p> <p>1 were going through your references in your report to 2 identify any in vivo animal models that you claim show 3 the same results that you report in your manuscript. 4 Can you cite for us the publications that you contend 5 show the same results as your manuscript in an animal 6 model? 7 MS. O'DELL: Object to the form. 8 You may answer. 9 THE WITNESS: So I am responding that I read 10 in some references and reviews that there was an in 11 vivo animal studies that showed association of talcum 12 powder use with increased risk of ovarian cancer in 13 animal models, and the reference for that is in the NTP 14 studies. 15 BY MR. HEGARTY: 16 Q. That study did not measure the pro-oxidant and 17 anti-oxidant markers that you measure in your study, 18 correct? 19 A. They talk about oxidative stress in general, 20 inflammation in general. 21 Q. But they don't -- that study doesn't measure the 22 pro-oxidant or anti-oxidant markers that you report in 23 your study, correct? 24 A. That study, no. 25 Q. The NTP study concerned findings in the lungs of the</p>	<p style="text-align: right;">Page 197</p> <p>1 A. There is a table actually that summarize the results, 2 and it doesn't show it with all markers, so we can 3 refer to it, so if you look, for example -- 4 MS. O'DELL: What figure? 5 THE WITNESS: The figure Table 2, if you look 6 at GSR, GSR no effect, SOD3 no effect, catalase there 7 is an effect in some cells, not others, you can see 8 that A2780 has no effect, the talc treatment. 9 BY MR. HEGARTY: 10 Q. But with regard to the cells that it did have an 11 effect, SKOV-3, for example, with regard to -- 12 A. SKOV with regard to catalase, for example, has no 13 effect. 14 Q. With regard to -- 15 A. TOV112 with catalase there is an effect. 16 Q. And was that effect in all the cells tested with talc? 17 MS. O'DELL: Object to the form. 18 THE WITNESS: I don't understand your 19 question. 20 BY MR. HEGARTY: 21 Q. Well, don't you -- do you contend that those genotype 22 changes occurred in all cells treated with talc? 23 A. I didn't say that. 24 Q. Did that happen? 25 A. No. What I'm saying is if you treat the cell line,</p>

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<p style="text-align: right;">Page 198</p> <p>1 okay, TOV112, with talc for 72 hours, there will be an 2 increase, an acquisition of this mutation. Now, you're 3 asking if I determined whether all cells in that 4 population got this mutation. 5 Q. Correct. 6 A. The answer is I don't know. 7 Q. Are you able to determine the quantity of cells -- let 8 me back up. How many cells are in the culture? 9 A. Yeah, so this is DNA extracted from 1 million cells 10 treated with 100 microgram per ml of talcum powder. 11 Now, there is another way you can quantitate if we need 12 to proceed further with this. 13 Q. Are you able to estimate the volume of cells that this 14 genotype switch occurred in? 15 MS. O'DELL: Object to the form. 16 THE WITNESS: The volume? 17 BY MR. HEGARTY: 18 Q. Yes, the number. 19 MS. O'DELL: Object to form. 20 THE WITNESS: I just said, no, we can't. 21 This technique will tell you yes or no, doesn't tell 22 you how much -- how many, sorry. 23 BY MR. HEGARTY: 24 Q. So would it tell you, yes, if it -- (coughing in 25 room) -- only one of the 1 ml cells?</p>	<p style="text-align: right;">Page 200</p> <p>1 Q. What do you mean when you say induces significant 2 changes? What does that mean, what does the word 3 significant there mean? 4 A. Got you. So this means marginal change, it's not -- 5 here the words does not imply statistically significant 6 is that you're referring to, although the results were 7 statistically significant, this is referring to the 8 magnitude. 9 Q. And how do you define -- how did you define the 10 magnitude as significant? 11 A. You don't, many readers assume significant is 12 statistically significant. 13 Q. Was the choice of the word significant a subjective 14 word choice by you? 15 A. I chose this word because it applies that there is a 16 significant effect which I know it is. 17 Q. And when you say significant effect, what do you mean? 18 A. I mean both marginal and statistically significant. 19 Q. What does it mean to have a marginal effect? 20 A. Marked like, for example, it is not like 1 versus 1.35, 21 it is 1 versus 3, that's mean marginal. 22 Q. You say about the middle of that paragraph that in all 23 talc treated cells, do you see where I'm reading? 24 A. Yes. 25 Q. There was a significant dose-dependent increase in</p>
<p style="text-align: right;">Page 199</p> <p>1 MS. O'DELL: Object to the form. 2 THE WITNESS: Again, this is not 3 quantitative. This will tell you if there is a 4 mutation or there is no mutation. 5 BY MR. HEGARTY: 6 Q. Without regard to the number of cells the mutation 7 occurred in? 8 MS. O'DELL: Objection to the form. 9 THE WITNESS: Okay. I will repeat myself 10 again. This is -- this technique will tell you if 11 there are population of cells that acquired this 12 genotype. 13 BY MR. HEGARTY: 14 Q. Does it tell you the number of such a population? 15 A. I just said no. 16 Q. If you look at Page 2 of your abstract, I'm sorry, your 17 manuscript, the abstract, looking at the Abstract 18 Section, second line towards the end, you say here 19 we've demonstrated that talc induces significant 20 changes in key redox enzymes and enhances the 21 pro-oxidant state in normal and EOC cells. 22 A. Where are you reading? Sorry. 23 Q. The second line, towards the end of the second line. 24 A. Towards the end of the second line -- here, yes, I see 25 it I see it.</p>	<p style="text-align: right;">Page 201</p> <p>1 pro-oxidants iNOS, nitrate/nitrite, and MPO with a 2 concomitant decrease in anti-oxidants CAT, SOD, GSR, 3 and GPX. Do you see where I'm reading? 4 A. Yes. 5 Q. What do you mean when you use the phrase significant 6 there? 7 A. It is indicated by the P value, so once you have the P 8 value, that's -- indicates statistically significant. 9 Q. And when you say an increase and a decrease as compared 10 to what? 11 A. To untreated. It says all talc treated cells. 12 Q. There is no data that correlates your findings and your 13 experiments to ovarian cancer risk in humans, correct? 14 MS. O'DELL: Objection, form. 15 THE WITNESS: One more time, please. 16 BY MR. HEGARTY: 17 Q. Sure. There is no data that correlates your findings 18 in this manuscript to ovarian cancer risk in women, 19 correct? 20 MS. O'DELL: Objection to form. 21 THE WITNESS: So my data explain, explain and 22 actually classify and characterize epithelial ovarian 23 cancer cells to have a pro-oxidant state, and we were 24 the first lab to actually demonstrate that epithelial 25 ovarian cancer cells manifest a pro-oxidant state by</p>

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<p>1 increasing in these pro-oxidants that we have here and</p> <p>2 decreasing the anti-oxidant that we studied. So this</p> <p>3 is a -- I have written a review article about this, I</p> <p>4 have written a book chapter about this, this is the</p> <p>5 major focus of my lab is to characterize the ovarian</p> <p>6 cancer cells as a pro-oxidant, that they manifest a</p> <p>7 pro-oxidant state and we characterize it.</p> <p>8 BY MR. HEGARTY:</p> <p>9 Q. There is no data showing that these increases or</p> <p>10 decreases increase the risk of ovarian cancer in women,</p> <p>11 correct?</p> <p>12 MS. O'DELL: Objection to form.</p> <p>13 THE WITNESS: Okay, so there are data that --</p> <p>14 recent data that showing, for example, I'll give you an</p> <p>15 example, myeloperoxidase is a marker of inflammation.</p> <p>16 My lab was the first lab in the entire world to report</p> <p>17 that myeloperoxidase is expressed by epithelial ovarian</p> <p>18 cancer cells, although this marker is only supposed to</p> <p>19 be a myeloid marker, which is a blood marker, a blood</p> <p>20 cells marker, not a nonmyeloid. Several reports later</p> <p>21 they confirm my finding, and not only that, other labs</p> <p>22 have just -- they reported that the SNP that we use</p> <p>23 here, it is correlated with increased risk of ovarian</p> <p>24 cancer, that's reported. That's number one.</p> <p>25 Another example, SOD, catalase, those two</p>	<p>1 BY MR. HEGARTY:</p> <p>2 Q. And that's been recognized to be associated in a genome</p> <p>3 wide significantly way?</p> <p>4 MS. O'DELL: Object to the form.</p> <p>5 THE WITNESS: I don't know what you mean by</p> <p>6 genome wide.</p> <p>7 BY MR. HEGARTY:</p> <p>8 Q. Well, you're familiar with what the --</p> <p>9 A. SNP is --</p> <p>10 Q. -- GWAS --</p> <p>11 A. Yes.</p> <p>12 Q. -- the GWAS study is, correct? Are you familiar with</p> <p>13 that?</p> <p>14 MS. O'DELL: Would you repeat the question?</p> <p>15 I couldn't hear it.</p> <p>16 BY MR. HEGARTY:</p> <p>17 Q. I asked him if he's familiar with what GWAS is.</p> <p>18 A. Yes.</p> <p>19 Q. What is it?</p> <p>20 A. It's the genome wide association where they list all</p> <p>21 the SNPs and their frequency of occurrence and their</p> <p>22 what they call it -- frequency of occurrence in general</p> <p>23 population.</p> <p>24 Q. And what SNPs in your manuscript have been associated</p> <p>25 by the GWAS studies with ovarian cancer?</p>
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<p>1 enzymes and one more -- okay, but for those two, I know</p> <p>2 for a fact that their SNPs has also been reported to be</p> <p>3 associated with increased risk of ovarian cancer in</p> <p>4 human, so that's for the genotype.</p> <p>5 For the markers, there are several studies in</p> <p>6 the literature that talk about alteration of oxidative</p> <p>7 stress and inflammation in ovarian cancer. Our lab,</p> <p>8 other labs have published, repeatedly published this,</p> <p>9 so this is, as far as I'm concerned, this is a fact for</p> <p>10 me, we have documented this, others documented this,</p> <p>11 and to confirm my work with a report from a different</p> <p>12 lab saying there is this myeloperoxidase SNP minus</p> <p>13 463AA correlates with increased risk of ovarian cancer,</p> <p>14 and we have this to be the genotype that changes in</p> <p>15 talc powder, that's incredible to me.</p> <p>16 BY MR. HEGARTY:</p> <p>17 Q. Identify the SNPs that you report in your manuscript</p> <p>18 that have been shown to have reached genome wide</p> <p>19 significance of association with ovarian cancer.</p> <p>20 A. Risk.</p> <p>21 MS. O'DELL: Object to form.</p> <p>22 THE WITNESS: Risk, so the minus, the same</p> <p>23 SNP that we use here, minus 63, 463, which is the MPO</p> <p>24 SNP, this SNP is recognized to be associated with</p> <p>25 increased risk of ovarian cancer in a human.</p>	<p>1 A. So this, okay, we're mixing up two things. I need to</p> <p>2 clarify this. So the GWAS, they identify the SNP.</p> <p>3 Then investigators after the SNP has been identified by</p> <p>4 the GWAS, they pick that SNP and they say, hmm, there's</p> <p>5 a lab that published that myeloperoxidase in ovarian --</p> <p>6 in epithelial ovarian cancer where it's not supposed to</p> <p>7 be there, well, let's do this study where we see if</p> <p>8 this SNP is indeed associated with increased risk of</p> <p>9 ovarian cancer. So that's not part of the GWAS study.</p> <p>10 They use the GWAS study information like I did it.</p> <p>11 Q. That's not my question, Doctor. My question is which</p> <p>12 of the SNPs that you report in your manuscript have</p> <p>13 been shown to be associated with ovarian cancer by the</p> <p>14 GWAS studies?</p> <p>15 MS. O'DELL: Objection to form.</p> <p>16 THE WITNESS: I just said what I have to say.</p> <p>17 BY MR. HEGARTY:</p> <p>18 Q. Well, none of the SNPs that you referred to in your</p> <p>19 manuscript have been identified by the GWAS studies as</p> <p>20 being associated with ovarian cancer risk, correct?</p> <p>21 MS. O'DELL: Object to the form.</p> <p>22 THE WITNESS: No, it's not correct because I</p> <p>23 repeat again, the GWAS have no responsibility to tell</p> <p>24 you, they don't do studies looking at association.</p> <p>25 They just list SNP and prevalence in general</p>

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<p style="text-align: right;">Page 206</p> <p>1 population, very clear.</p> <p>2 BY MR. HEGARTY:</p> <p>3 Q. So it's your contention that the GWAS, the genome wide</p> <p>4 significance of association doesn't list SNPs that are</p> <p>5 associated with ovarian cancer?</p> <p>6 MS. O'DELL: Object to the form.</p> <p>7 THE WITNESS: What I'm saying is, to my</p> <p>8 understanding, GWAS is an information bank where you go</p> <p>9 and you say, okay, there is -- there exists a catalase</p> <p>10 SNP, which is this SNP, this specific sequence that is</p> <p>11 present in .01 percent of general population. Above</p> <p>12 that will be characterized as risk factor. So now in</p> <p>13 the GWAS they identified the MPO SNP, the catalase SNP,</p> <p>14 the SOD SNP, all SNPs that it's like an information</p> <p>15 bank where you go to to find your information and then</p> <p>16 you go and study them. I study them, others study</p> <p>17 them, different labs can study them, but they do it for</p> <p>18 us. It's like the gene sequencing bank, it's the same</p> <p>19 thing, same concept, protein sequence bank. I don't</p> <p>20 need necessarily to go and sequence the whole thing to</p> <p>21 understand, it's already sequenced for me.</p> <p>22 BY MR. HEGARTY:</p> <p>23 Q. What does it mean for a SNP to reach genome wide</p> <p>24 significance?</p> <p>25 A. So there is a cutoff that they have in their website to</p>	<p style="text-align: right;">Page 208</p> <p>1 you reference in your manuscript and ovarian cancer.</p> <p>2 MS. O'DELL: Object to the form.</p> <p>3 THE WITNESS: So I'm not -- I am objecting to</p> <p>4 the word statistically significant, but I can identify</p> <p>5 several studies that, for example, looking at catalase</p> <p>6 SNP and its association with increased risk of ovarian</p> <p>7 cancer, myeloperoxidase SNP and its association with</p> <p>8 increased risk of ovarian cancer, there was one more</p> <p>9 I'm skipping, and so those two were definitely there.</p> <p>10 BY MR. HEGARTY:</p> <p>11 Q. Why do you object to my use of the phrase statistical</p> <p>12 significance?</p> <p>13 A. Because I am not sure if they did -- they did molecular</p> <p>14 study or they did a different type of study, so I'm</p> <p>15 just, you know, not familiar with the epidemiological</p> <p>16 studies that they performed.</p> <p>17 Q. Well, cite for me any studies that show, as you say, an</p> <p>18 association between MPO or CAT and ovarian cancer.</p> <p>19 MS. O'DELL: Object to the form.</p> <p>20 THE WITNESS: MPO?</p> <p>21 BY MR. HEGARTY:</p> <p>22 Q. Yes.</p> <p>23 A. The MPO SNP?</p> <p>24 Q. Yes.</p> <p>25 A. That's what we're talking about?</p>
<p style="text-align: right;">Page 207</p> <p>1 each based on epidemiological studies that there is</p> <p>2 association, if it increased over this level, it could</p> <p>3 be associated with diseases.</p> <p>4 Q. Which of the SNPs that you reference in your manuscript</p> <p>5 have been associated with ovarian cancer, in other</p> <p>6 words, which have reached genome wide significance?</p> <p>7 MS. O'DELL: Object to the form.</p> <p>8 THE WITNESS: I can answer this. I know for</p> <p>9 a fact it's catalase, not only ovarian but also in</p> <p>10 breast cancer, and they are twins.</p> <p>11 BY MR. HEGARTY:</p> <p>12 Q. Any others?</p> <p>13 A. I'm not -- I can't remember the actual -- for me, the</p> <p>14 GWAS was an information bank where I get my -- the</p> <p>15 information I need to perform the studies, like me and</p> <p>16 others in the same situation.</p> <p>17 Q. Cite for me any published literature that is</p> <p>18 associated -- that has shown a clinical significant</p> <p>19 association between the SNPs that you reference in your</p> <p>20 paper and ovarian cancer.</p> <p>21 A. I'm sorry, one more time.</p> <p>22 MS. O'DELL: Object to the form.</p> <p>23 BY MR. HEGARTY:</p> <p>24 Q. Identify for me any published literature that shows a</p> <p>25 statistically significant association between the SNPs</p>	<p style="text-align: right;">Page 209</p> <p>1 Q. Yes.</p> <p>2 A. Yes, I can cite.</p> <p>3 Q. Cite for me a study.</p> <p>4 A. I don't remember it now, but there is study.</p> <p>5 Q. Did you cite it in your manuscript?</p> <p>6 A. I believe so. Let's talk -- let's see about where we</p> <p>7 talk about SNP. Okay, were the first to do this --</p> <p>8 sorry -- I would be very happy to provide you with</p> <p>9 these references that I mentioned, MPO and catalase and</p> <p>10 the SNP in ovarian cancer.</p> <p>11 Q. Can you cite for me here today any studies associating</p> <p>12 catalase or MPO with ovarian cancer?</p> <p>13 MS. O'DELL: Object to the form. You mean</p> <p>14 the SNP?</p> <p>15 THE WITNESS: I can't remember where I put</p> <p>16 it.</p> <p>17 BY MR. HEGARTY:</p> <p>18 Q. How much time do you need to look, Doctor?</p> <p>19 A. See, I write this every day so I get so overwhelmed.</p> <p>20 Q. Let's go off the record.</p> <p>21 A. So we're looking for catalase SNP for --</p> <p>22 MS. O'DELL: Stay on, if you're -- do you</p> <p>23 need more time, Doctor, or are you --</p> <p>24 THE WITNESS: I'm trying to find it in my --</p> <p>25 MR. HEGARTY: Let's go off the record.</p>

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<p style="text-align: right;">Page 210</p> <p>1 THE WITNESS: I mean I may not even reference</p> <p>2 it here so I don't know.</p> <p>3 THE VIDEOGRAPHER: Going off the record at</p> <p>4 3:23 p.m.</p> <p>5 (An off-the-record discussion was held.)</p> <p>6 THE VIDEOGRAPHER: We're back on the record</p> <p>7 at 3:26 p.m.</p> <p>8 BY MR. HEGARTY:</p> <p>9 Q. Doctor, when we went off the record I asked you for any</p> <p>10 studies associating catalase or MPO with ovarian</p> <p>11 cancer. You've had a chance to look for such studies,</p> <p>12 and what is your response?</p> <p>13 A. So there's one study by Olson, et al., that was</p> <p>14 published in Gynecology Oncology 2004.</p> <p>15 Q. How do you spell his first name?</p> <p>16 A. O-l-s-o-n, and it's looking at SOD and MPO SNP. There</p> <p>17 is an increased risk of ovarian cancer. I couldn't</p> <p>18 find the catalase one, but it is there, I can search</p> <p>19 for it, it is hundred percent there. There is another</p> <p>20 one looking at Superoxide dismutase published in JBC</p> <p>21 Journal by Yumin, et al.</p> <p>22 Q. How do you spell that?</p> <p>23 A. Y-u-m-i-m, Hu, H-u. And there is one more which is</p> <p>24 about catalase if you -- SNP.</p> <p>25 Q. What is the date of the Yumin article?</p>	<p style="text-align: right;">Page 212</p> <p>1 am -- if you define lead author as corresponding author</p> <p>2 or first author?</p> <p>3 Q. First author.</p> <p>4 A. Is Dr. Belotte, he was an M.D., Ph.D. trained in my</p> <p>5 laboratory. I was his Ph.D. advisor.</p> <p>6 Q. What year? What is the year of the article?</p> <p>7 A. Oh, sorry, 2015.</p> <p>8 Q. What is the name of the article?</p> <p>9 A. Single Nucleotide Polymorphism in Catalase is Strongly</p> <p>10 Associated With Ovarian Cancer Survival.</p> <p>11 Q. So that article doesn't have anything to do with</p> <p>12 ovarian cancer initiation, correct?</p> <p>13 MS. O'DELL: Object to the form.</p> <p>14 THE WITNESS: Is that another question?</p> <p>15 BY MR. HEGARTY:</p> <p>16 Q. Yes.</p> <p>17 A. Saying --</p> <p>18 Q. In that article, it associated catalase with ovarian</p> <p>19 cancer survival, correct?</p> <p>20 A. Uh-huh.</p> <p>21 Q. It didn't associate catalase with causing ovarian</p> <p>22 cancer, correct?</p> <p>23 MS. O'DELL: Object to the form.</p> <p>24 THE WITNESS: So in this article what we did,</p> <p>25 we actually, this is -- we identified the SNP and</p>
<p style="text-align: right;">Page 211</p> <p>1 A. What's the data?</p> <p>2 Q. What's the date?</p> <p>3 A. Oh, the date, I'm sorry. Can I look?</p> <p>4 Q. Yes.</p> <p>5 A. So the date was 2005.</p> <p>6 Q. And then you believe there's an article that associates</p> <p>7 catalase to ovarian cancer?</p> <p>8 A. Yes.</p> <p>9 Q. You can't recall that article sitting here today?</p> <p>10 A. I have it here, it's Catalase Nucleotide SNP Strongly</p> <p>11 Associated With Ovarian Cancer, this is by -- from our</p> <p>12 lab and from another lab, also.</p> <p>13 Q. What is the -- who is the first author?</p> <p>14 A. From my lab?</p> <p>15 Q. Well, you said --</p> <p>16 A. This second one, the second one is by -- so this is our</p> <p>17 paper, and there's one here.</p> <p>18 Q. When you say our paper, who's the lead author?</p> <p>19 A. Okay. Can I just tell you the paper? So this is</p> <p>20 published in -- it says The Effect of Catalase SNP and</p> <p>21 Susceptibility to Ovarian Cancer, and this is by --</p> <p>22 published in -- doesn't -- it's in 2017, and it doesn't</p> <p>23 tell me the journal, Journal of Obstetrics and</p> <p>24 Gynecology, Volume 38, 2018, Issue 4.</p> <p>25 And going back to your previous question, I</p>	<p style="text-align: right;">Page 213</p> <p>1 catalase that others also identified, and we looked at</p> <p>2 the presence of the SNP in chemoresistance versus</p> <p>3 sensitive looking at different parameters, and we</p> <p>4 actually reversed the SNP using the CRISPR editing,</p> <p>5 gene editing, and we induced apoptosis, so there was</p> <p>6 like a survival mechanism.</p> <p>7 BY MR. HEGARTY:</p> <p>8 Q. Doctor, the article you actually cite and which you</p> <p>9 included as an author found that with regard to the</p> <p>10 seven selected SNP study, no association -- you found</p> <p>11 no association with ovarian cancer risk, correct?</p> <p>12 MS. O'DELL: Object to the form.</p> <p>13 THE WITNESS: Which article you talking</p> <p>14 about?</p> <p>15 BY MR. HEGARTY:</p> <p>16 Q. The article with the lead author Belotte, Belotte.</p> <p>17 A. Jimmy Belotte, okay, what about it?</p> <p>18 Q. Your article looked at CAT, CYBA, GPX1, GSR, MnSOD,</p> <p>19 MPO, and NOS2, correct?</p> <p>20 A. Yes.</p> <p>21 Q. You found doing the same kind of testing you did here</p> <p>22 that none of those SNPs was associated with ovarian</p> <p>23 cancer risk, correct?</p> <p>24 MS. O'DELL: Object to the form.</p> <p>25 THE WITNESS: No.</p>

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<p style="text-align: right;">Page 214</p> <p>1 MS. O'DELL: Excuse me. Object to the form. 2 If you need to see the paper -- 3 THE WITNESS: Yeah, it's been a while but -- 4 MS. O'DELL: If you need to see the paper. 5 SAED DEPOSITION EXHIBIT NUMBER 17, 6 RESEARCH ARTICLE, 7 WAS MARKED BY THE REPORTER 8 FOR IDENTIFICATION 9 BY MR. HEGARTY: 10 Q. I marked as Exhibit 17 the paper. 11 A. Very good. 12 Q. Show me in that paper where you found an association 13 with the listed SNPs and ovarian cancer risk. 14 A. Okay. So there is no -- this study we looked at, this 15 particular SNP and catalase that we found, the other we 16 found that they are not associated with survival, so 17 this study was basically looking at survival of ovarian 18 cancer. So this is not a study meant to study risk. 19 MR. KLATT: Objection, nonresponsive. 20 BY MR. HEGARTY: 21 Q. If you look over at Page 11 of your manuscript. 22 MS. O'DELL: Which page -- 23 MR. HEGARTY: It's Exhibit 7. 24 MS. O'DELL: Well, he just has one manuscript 25 in his hand. Do you know where we are, Doctor?</p>	<p style="text-align: right;">Page 216</p> <p>1 that it? And it's also in your notebook at 34 if you 2 both need it so. 3 THE WITNESS: Can I look at it? 4 BY MR. HEGARTY: 5 Q. Yes, go ahead and look at 34. 6 A. I can't remember if we did the same SNP in both 7 studies, so I just want to make sure that we did that, 8 because there are several SNPs for the same enzyme 9 reported in the GWAS. 10 Q. How long will it take you to look at -- you did the 11 same SNPs in the Belotte article as you did here? 12 A. I have to look at the accession numbers and compare 13 them. 14 Q. Well, we'll maybe get to that, but my question goes 15 back to your reference on Page -- 16 MS. O'DELL: 34. 17 MR. HEGARTY: Your reference to that article 18 on Page 11 of your manuscript, you quote that article 19 as saying that you examined several selected known gene 20 mutations corresponding to SNPs known to be associated 21 with altered enzyme activity and increased cancer risk. 22 What part of that Belotte article shows that the SNPs 23 that you examined are associated with increased cancer 24 risk? 25 THE WITNESS: So if you look at the table,</p>
<p style="text-align: right;">Page 215</p> <p>1 THE WITNESS: Page 11 -- 2 BY MR. HEGARTY: 3 Q. Yes, Page 11. The first sentence of the third 4 paragraph beginning To Elucidate the Mechanism, do you 5 see that? 6 A. Yes. 7 Q. You state later in that sentence, we have examined 8 selected known gene mutations corresponding to SNPs 9 known to be associated with altered enzymatic activity 10 and increased cancer risk. Do you see where I'm 11 reading? 12 A. To elucidate the mechanism, that paragraph? 13 Q. Yes. 14 A. Okay. 15 Q. And at the end of that sentence you cite Reference 28. 16 A. Okay. 17 Q. And Reference 28 is that Belotte article, correct? 18 A. 28 is Belotte, yes. 19 Q. Can you hand me the Belotte article back, please. 20 A. (Witness complied.) 21 Q. In the Belotte article you say of the seven selected 22 SNPs studied, no association with ovarian cancer risk 23 was found. That's what you found, correct, Doctor? 24 MS. O'DELL: Objection to form. If you need 25 to see Belotte -- do you have another copy, Mike, or is</p>	<p style="text-align: right;">Page 217</p> <p>1 Page 3, Dr. Belotte's article, there is a table here 2 that lists what is the SNP, what is the mean allele 3 frequency occurrence, the chromosomal equation, and if 4 it is known nucleotide switch, and the effect of 5 activity. So there are SNPs that affect activity of 6 the enzymes, and if they do, they are, according to our 7 findings, they are associated with anything that alters 8 oxidative stress to the pro-oxidant state can 9 contribute to increased risk. 10 BY MR. HEGARTY: 11 Q. But you in your paper, Exhibit 17, say that the SNPs 12 you studied showed no association with ovarian cancer 13 risk, correct? 14 A. Which one? 15 Q. The Belotte paper. 16 A. Oh, keep saying what paper. 17 Q. You look at the abstract. 18 A. So, again, we're looking at specific SNPs. 19 Q. Correct. 20 A. Right, so -- 21 Q. And in the specific -- 22 A. Some of the SNPs that we looked at when we did this 23 study, they were associated with survival of ovarian 24 cancer, that's what we tested. 25 Q. None of the SNPs --</p>

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<p style="text-align: right;">Page 218</p> <p>1 MR. KLATT: Nonresponsive.</p> <p>2 BY MR. HEGARTY:</p> <p>3 Q. Doctor, you also examined whether the SNPs reported in</p> <p>4 this study were associated with ovarian cancer risk,</p> <p>5 correct, not just survival?</p> <p>6 MS. O'DELL: Objection, form.</p> <p>7 THE WITNESS: Give me a moment to see, to</p> <p>8 refresh my memory. This is 2015, so I need to remember</p> <p>9 what we did. I have done many work.</p> <p>10 BY MR. HEGARTY:</p> <p>11 Q. How much time do you need to study that article?</p> <p>12 A. Just -- okay, so in this study we only did survival,</p> <p>13 the Jimmy Belotte study, this is my -- yeah, so this</p> <p>14 here we only did analysis of survival.</p> <p>15 Q. Doctor, if you turn over to Page 6 of that article at</p> <p>16 the very bottom, third from -- third line from the</p> <p>17 bottom, you write that currently we demonstrated that</p> <p>18 there is no association between the selected SNPs and</p> <p>19 risk of developing ovarian cancer, citing Table 2,</p> <p>20 those are your words, correct?</p> <p>21 A. Yeah, Table 2 is, let's see --</p> <p>22 MS. O'DELL: What were you reading?</p> <p>23 MR. HEGARTY: The bottom of Page 6 of 12.</p> <p>24 THE WITNESS: Yeah, I see that.</p> <p>25</p>	<p style="text-align: right;">Page 220</p> <p>1 with it.</p> <p>2 MS. O'DELL: It is not.</p> <p>3 MR. KLATT: He's perfectly entitled to look</p> <p>4 things up to answer them, but it doesn't count against</p> <p>5 our time.</p> <p>6 MS. O'DELL: He's not looking things up.</p> <p>7 He's looking at the exhibit that had been placed before</p> <p>8 him.</p> <p>9 THE COURT REPORTER: Excuse me --</p> <p>10 (Simultaneous crosstalk.)</p> <p>11 MS. O'DELL: We are on the record.</p> <p>12 And, Doctor, if you are prepared to respond</p> <p>13 to the question, you may do so. If you need a minute,</p> <p>14 let us know that.</p> <p>15 BY MR. HEGARTY:</p> <p>16 Q. How much time do you need to review the article,</p> <p>17 Doctor?</p> <p>18 A. I'm just asking you, please, where do you see in Table</p> <p>19 2.</p> <p>20 Q. I'm referring to your words at the bottom of Page 6</p> <p>21 that's referring over to Table 2, and I'm asking you is</p> <p>22 it your testimony that you did not investigate the</p> <p>23 association in this paper between these SNPs and</p> <p>24 ovarian cancer risk, is that your testimony?</p> <p>25 MS. O'DELL: Are you quoting a sentence?</p>
<p style="text-align: right;">Page 219</p> <p>1 BY MR. HEGARTY:</p> <p>2 Q. Doctor, is it your testimony that in this study you did</p> <p>3 not investigate whether the SNPs listed in Table 2 were</p> <p>4 associated with ovarian cancer risk?</p> <p>5 MS. O'DELL: Object to the form.</p> <p>6 THE WITNESS: Let me just look at this,</p> <p>7 sorry.</p> <p>8 MR. HEGARTY: Let's go off the record.</p> <p>9 MS. O'DELL: He's just looking at the table.</p> <p>10 Ask him a question, he's entitled --</p> <p>11 MR. HEGARTY: Let's go off the record.</p> <p>12 MS. O'DELL: No, we're not.</p> <p>13 MR. HEGARTY: We're going off the record.</p> <p>14 MS. O'DELL: No, we're not.</p> <p>15 MR. KLATT: We're going to call Judge Pisano.</p> <p>16 MS. O'DELL: Wait a minute. Let me speak.</p> <p>17 If you ask the doctor about his manuscript, he is not</p> <p>18 required to have put to memory every word and table in</p> <p>19 the manuscript. If you ask him about something, he is</p> <p>20 entitled to look at it and reply completely. And to</p> <p>21 somehow suggest if he takes more than 15 seconds we're</p> <p>22 going off the record, that's ridiculous.</p> <p>23 MR. KLATT: It's every single time he's asked</p> <p>24 a question, he wants to look something up. This is</p> <p>25 slow walking the deposition, we're not going to put up</p>	<p style="text-align: right;">Page 221</p> <p>1 What sentence are you referring to?</p> <p>2 MR. HEGARTY: I'm not -- you're not taking</p> <p>3 this deposition of me. I'll let my question stand.</p> <p>4 MS. O'DELL: Object to the form of the</p> <p>5 question, it's unclear. If there's a specific sentence</p> <p>6 you're referring to in the manuscript, you said bottom</p> <p>7 of Page 6, so if there's something you're referring to,</p> <p>8 I'd ask you direct the witness to it.</p> <p>9 BY MR. HEGARTY:</p> <p>10 Q. Can you answer my question, Doctor?</p> <p>11 MS. O'DELL: Object to the form.</p> <p>12 THE WITNESS: Where is the -- can you</p> <p>13 please --</p> <p>14 BY MR. HEGARTY:</p> <p>15 Q. Bottom of Page 6 for the second time.</p> <p>16 A. Yes.</p> <p>17 Q. I'm reading this to you, it says currently we</p> <p>18 demonstrated that there is no association between the</p> <p>19 selected SNPs and risk of developing ovarian cancer,</p> <p>20 Table 2. Do you see that?</p> <p>21 A. Yes.</p> <p>22 Q. Is it your testimony that this article did not</p> <p>23 investigate an association between the selected SNPs</p> <p>24 and ovarian cancer risk?</p> <p>25 A. In this study that we did with this number of people</p>

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<p style="text-align: right;">Page 222</p> <p>1 that we looked at, we found, okay, that the only</p> <p>2 catalase SNP is associated with ovarian cancer</p> <p>3 survival, none of the other SNPs were associated from</p> <p>4 these patients to increased risk of ovarian cancer.</p> <p>5 Q. Right.</p> <p>6 A. We only did 143, I believe, 94.</p> <p>7 Q. So the sentence that I read to you on Page 11 of your</p> <p>8 manuscript it's citation 28 is wrong, correct?</p> <p>9 MS. O'DELL: Objection to form.</p> <p>10 THE WITNESS: What's the citation?</p> <p>11 BY MR. HEGARTY:</p> <p>12 Q. Well, you support the sentence that says we have</p> <p>13 examined selected known gene mutations corresponding to</p> <p>14 SNPs known to be associated with altered enzymatic</p> <p>15 activity and increased ovarian cancer risk citing 28.</p> <p>16 28 doesn't support a finding that the SNPs you tested</p> <p>17 show increased ovarian cancer risk, correct?</p> <p>18 MS. O'DELL: Object to the form.</p> <p>19 THE WITNESS: What we -- again, this --</p> <p>20 what -- the SNPs that we are used here in this study,</p> <p>21 they were used in response to test the effect of talc</p> <p>22 treatment, talcum powder treatment to the genetic -- to</p> <p>23 the specific genetic mutations. Now, we link survival</p> <p>24 to risk, so, for example, if you look, most of our</p> <p>25 hypothesis --</p>	<p style="text-align: right;">Page 224</p> <p>1 answer it again.</p> <p>2 MS. O'DELL: You can go ahead and finish.</p> <p>3 Stop interrupting.</p> <p>4 THE COURT REPORTER: I cannot take</p> <p>5 everybody --</p> <p>6 MS. O'DELL: Here's my objection. The</p> <p>7 witness is being interrupted while he's trying to</p> <p>8 respond to the question, and so if there's a question</p> <p>9 pending the doctor is trying to answer, you cannot</p> <p>10 interrupt him.</p> <p>11 MR. HEGARTY: Well, the record's going to</p> <p>12 speak for itself as far as his nonresponsiveness to my</p> <p>13 question.</p> <p>14 MS. O'DELL: Were you finished with your</p> <p>15 answer?</p> <p>16 MR. HEGARTY: I withdrew the question.</p> <p>17 MS. O'DELL: Were you finished with your</p> <p>18 answer?</p> <p>19 THE WITNESS: So what I'm trying to tell you,</p> <p>20 I cannot remember that we did the same exact SNP in</p> <p>21 Jimmy Belotte study and this study.</p> <p>22 BY MR. HEGARTY:</p> <p>23 Q. That was not my question. My question is specific to</p> <p>24 this study.</p> <p>25 A. To the Jimmy Belotte study.</p>
<p style="text-align: right;">Page 223</p> <p>1 BY MR. HEGARTY:</p> <p>2 Q. I object to it's nonresponsive. Doctor, you're not</p> <p>3 answering my question. I'm going to withdraw the</p> <p>4 question.</p> <p>5 MS. O'DELL: Don't cut him off if he's</p> <p>6 finishing --</p> <p>7 MR. HEGARTY: He's not finishing, he's</p> <p>8 answering something else.</p> <p>9 MS. O'DELL: He's trying to answer your</p> <p>10 question.</p> <p>11 MR. HEGARTY: I withdrew the question.</p> <p>12 Listen to my question, Doctor. Does the</p> <p>13 Belotte paper show that the SNPs you looked at are</p> <p>14 associated with increased cancer risk?</p> <p>15 THE WITNESS: Ovarian cancer risk.</p> <p>16 BY MR. HEGARTY:</p> <p>17 Q. Ovarian cancer risk.</p> <p>18 A. So what I'm trying to tell you, according to this</p> <p>19 paper, we only tested limited number of patients.</p> <p>20 Q. Listen to my question.</p> <p>21 A. And I'm not sure, I'm answering, trying to answer.</p> <p>22 Q. You're not answering the question. I'm going to</p> <p>23 withdraw the question.</p> <p>24 A. Can I finish?</p> <p>25 Q. I'm going to withdraw the question. I'm going to</p>	<p style="text-align: right;">Page 225</p> <p>1 Q. Correct.</p> <p>2 A. Yes.</p> <p>3 Q. And reading from your study in the abstract, starting</p> <p>4 on the third line it says we sought to evaluate the</p> <p>5 association of SNPs in key oxidant and anti-oxidant</p> <p>6 enzymes with increased risk in survival in epithelial</p> <p>7 ovarian cancer. So you agree in this study that you</p> <p>8 looked at certain specific SNPs with regard to</p> <p>9 increased risk of ovarian cancer, correct?</p> <p>10 A. Those SNPs, yes.</p> <p>11 Q. You found from your study that those SNPs were not</p> <p>12 associated with increased ovarian cancer risk, correct?</p> <p>13 A. Correct.</p> <p>14 MS. O'DELL: Object to the form.</p> <p>15 THE WITNESS: Correct.</p> <p>16 BY MR. HEGARTY:</p> <p>17 Q. Can you cite for me any study that has shown the SNPs</p> <p>18 you report, you discuss in your manuscript to occur in</p> <p>19 women using talc?</p> <p>20 MS. O'DELL: Object to the form.</p> <p>21 THE WITNESS: That the SNP that we used in</p> <p>22 this study --</p> <p>23 BY MR. HEGARTY:</p> <p>24 Q. In the manuscript.</p> <p>25 A. In the manuscript, any of these SNPs has been</p>

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<p style="text-align: right;">Page 226</p> <p>1 associated with woman using talc?</p> <p>2 Q. Correct.</p> <p>3 A. I don't know.</p> <p>4 Q. Can you report -- can you cite for me any studies</p> <p>5 showing the enzyme activity that you report to have</p> <p>6 occurred with application of talc use to be in women</p> <p>7 using talc?</p> <p>8 MS. O'DELL: Object to the form.</p> <p>9 THE WITNESS: So if other people have done</p> <p>10 the same work that I did with samples from woman who</p> <p>11 got ovarian cancer and they used talc?</p> <p>12 BY MR. HEGARTY:</p> <p>13 Q. Can you cite for me any study showing your findings as</p> <p>14 to decrease in the expression of anti-oxidant enzymes</p> <p>15 and the increased expression in pro-oxidant enzymes in</p> <p>16 women using talc?</p> <p>17 MS. O'DELL: Object to the form.</p> <p>18 THE WITNESS: I can cite to you several</p> <p>19 studies that have indicated the pro-oxidant state and</p> <p>20 the anti-oxidant state in several human, animal, in</p> <p>21 vitro studies of cells with ovarian cancer.</p> <p>22 BY MR. HEGARTY:</p> <p>23 Q. That's not my question. My question, Doctor, is can</p> <p>24 you cite for me any studies showing your findings as to</p> <p>25 decrease in the expression of anti-oxidants and the</p>	<p style="text-align: right;">Page 228</p> <p>1 THE WITNESS: So other than the similarities</p> <p>2 in the mechanism, direct link with woman who use</p> <p>3 specific talc on that day, I don't know.</p> <p>4 BY MR. HEGARTY:</p> <p>5 Q. Let's take a break.</p> <p>6 THE VIDEOGRAPHER: We're going off the record</p> <p>7 at 3:49 p.m.</p> <p>8 (A short recess was taken.)</p> <p>9 THE VIDEOGRAPHER: We're back on the record</p> <p>10 at 4:05 p.m.</p> <p>11 BY MR. HEGARTY:</p> <p>12 Q. Doctor, in looking at your manuscript again Page 13,</p> <p>13 I'm sorry, in looking at your report, sorry, Page 13,</p> <p>14 you describe the cell lines that you use for purposes</p> <p>15 of your experiments, is that correct?</p> <p>16 A. In the cell lines section?</p> <p>17 Q. Yes.</p> <p>18 A. Yes.</p> <p>19 Q. Which of those cell lines -- strike that. What sub</p> <p>20 type of ovarian cancer are these cells?</p> <p>21 A. Sorry. Unknown.</p> <p>22 Q. You don't know whether they're high grade, serous,</p> <p>23 endometrioid, mucinous, clear cell?</p> <p>24 MS. O'DELL: Object to the form.</p> <p>25 THE WITNESS: When we purchased these cell</p>
<p style="text-align: right;">Page 227</p> <p>1 increase expression of pro-oxidants in women using talc</p> <p>2 on their bodies?</p> <p>3 MS. O'DELL: Object to the form.</p> <p>4 THE WITNESS: I don't know.</p> <p>5 BY MR. HEGARTY:</p> <p>6 Q. Can you cite for me any study showing the results --</p> <p>7 showing any of the results in your manuscript to</p> <p>8 occur -- to have occurred in women applying talc to</p> <p>9 their bodies?</p> <p>10 MS. O'DELL: Object to the form.</p> <p>11 THE WITNESS: So let's go back. I have --</p> <p>12 this is important. Good question. My answer is</p> <p>13 simple. The fact that you -- that talc has been shown</p> <p>14 to elicit a molecular response, that is same response</p> <p>15 that you get in the pro-oxidant state that has been</p> <p>16 published by many people in ovarian cancer, that is, to</p> <p>17 my understanding, link talcum powder to increased risk</p> <p>18 of ovarian cancer.</p> <p>19 BY MR. HEGARTY:</p> <p>20 Q. Object as nonresponsive. Listen to my question,</p> <p>21 Doctor. My question is can you cite for me any studies</p> <p>22 showing the findings you report in your manuscript or</p> <p>23 in your expert report in this case to have occurred or</p> <p>24 been reported in women using talc on their bodies?</p> <p>25 MS. O'DELL: Object to the form.</p>	<p style="text-align: right;">Page 229</p> <p>1 lines from ATCC, they have described them where they</p> <p>2 isolated from and what's the patient and all that, but</p> <p>3 I can't remember exactly which one is which.</p> <p>4 BY MR. HEGARTY:</p> <p>5 Q. So are any of these cell lines or have any of these</p> <p>6 cell lines been qualified as high grade serous ovarian</p> <p>7 cancer cell lines?</p> <p>8 MS. O'DELL: Object to the form.</p> <p>9 THE WITNESS: I can't remember.</p> <p>10 BY MR. HEGARTY:</p> <p>11 Q. You say that your experiments used what you call --</p> <p>12 well, you say immortalized human fallopian tube</p> <p>13 epithelial cells FT33, is that right?</p> <p>14 A. FT33, yes.</p> <p>15 Q. Those, as you note in your paper, are immortalized cell</p> <p>16 lines, correct?</p> <p>17 A. Correct.</p> <p>18 Q. And such cell lines are considered abnormal or</p> <p>19 precancerous, isn't that correct?</p> <p>20 A. Not necessarily.</p> <p>21 Q. Well, they were modified to essentially live forever,</p> <p>22 correct?</p> <p>23 A. No, it's not correct.</p> <p>24 Q. Well --</p> <p>25 A. They're modified so they can be consistent.</p>

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<p style="text-align: right;">Page 230</p> <p>1 Q. But normal cells are not immortalized cells, correct?</p> <p>2 A. Correct.</p> <p>3 Q. And to immortalize a cell, you have to fundamentally</p> <p>4 change the cell, correct?</p> <p>5 A. Not correct.</p> <p>6 Q. Well, you typically have to induce something like the</p> <p>7 SV40 DNA tumor virus, correct?</p> <p>8 A. Correct.</p> <p>9 Q. And that alters the makeup of the cells, correct?</p> <p>10 A. Not necessarily.</p> <p>11 Q. Well, it essentially shuts off, for example, the P53</p> <p>12 cell, P53 marker, correct?</p> <p>13 A. Oncogene.</p> <p>14 Q. Oncogene, correct? And these cells carry essentially a</p> <p>15 functional equivalent of four critical oncogenes,</p> <p>16 oncogenic mutations in tumor suppression pathways that</p> <p>17 have been implicated in ovarian carcinogenesis,</p> <p>18 correct?</p> <p>19 A. Let me explain to you, I have been conducting research</p> <p>20 all my career using primary cultures of cells</p> <p>21 established from -- fresh from patient tissues as well</p> <p>22 as immortalized cell lines. The problem with using</p> <p>23 primary cultures, the results cannot be reproduced,</p> <p>24 because if you passage the cells, they change their</p> <p>25 phenotype with passages, so researcher agreed upon this</p>	<p style="text-align: right;">Page 232</p> <p>1 THE WITNESS: So, again, I said one of the</p> <p>2 cell lines, I can't remember which, is from high grade,</p> <p>3 high serous grade. The others are not clearly</p> <p>4 identified by the ATCC information provided. But that</p> <p>5 was not my point of my research. My point of my</p> <p>6 research is to see does talcum powder induces or alter</p> <p>7 oxidative stress markers that we know and we have</p> <p>8 published in several documents that is associated with</p> <p>9 ovarian cancer.</p> <p>10 BY MR. HEGARTY:</p> <p>11 Q. Can you cite for me any data showing that the</p> <p>12 concentrations of exposure that you used in your</p> <p>13 experiments are similar or the same as would be</p> <p>14 occurring in women using talc on the perineum?</p> <p>15 A. I can't tell you that.</p> <p>16 Q. Can you cite for me any data that shows that the level</p> <p>17 of concentration of talc that you used in your cell</p> <p>18 studies has ever occurred in women applying talc to</p> <p>19 their bodies?</p> <p>20 MS. O'DELL: Object to the form.</p> <p>21 THE WITNESS: My response to this is I</p> <p>22 consider, according to my studies, I consider talc</p> <p>23 powder to be carcinogenic, and in my understanding of</p> <p>24 biology of cancer, there is no minimum threshold beyond</p> <p>25 which you are protected from developing cancer. Every</p>
<p style="text-align: right;">Page 231</p> <p>1 is the best utility that you have in vitro, that you</p> <p>2 can use immortalized cell lines, at least they are</p> <p>3 all -- their machinery of gene expression is controlled</p> <p>4 and it's consistent and reproducible with passages.</p> <p>5 Q. Did you do anything to correlate the cell lines you</p> <p>6 used to, for example, serous ovarian cancer cells in</p> <p>7 vivo?</p> <p>8 MS. O'DELL: Object to the form.</p> <p>9 THE WITNESS: Yeah, so from patients, this is</p> <p>10 our -- my next interest to do, to go -- I have</p> <p>11 extensive experience and expertise in isolating primary</p> <p>12 cultures at zero passages from patients' tissues,</p> <p>13 blood, and the fluid, and it is in my mind to do</p> <p>14 further testing of talcum powder and see if we can</p> <p>15 reproduce the effect on those cells.</p> <p>16 BY MR. HEGARTY:</p> <p>17 Q. When you say those cells, what do you mean?</p> <p>18 A. The primary freshly established cells from different</p> <p>19 histotypes of ovarian cancer.</p> <p>20 Q. Did you do anything --</p> <p>21 A. Because this is not available commercially.</p> <p>22 Q. Did you do anything to establish that the cell lines</p> <p>23 you were looking at are, for example, high grade</p> <p>24 serious ovarian cancer cell lines?</p> <p>25 MS. O'DELL: Object to the form.</p>	<p style="text-align: right;">Page 233</p> <p>1 time you're exposed to the insult. It's like</p> <p>2 radiation, it is a accumulative, it is registered in</p> <p>3 your body; that's my opinion.</p> <p>4 BY MR. HEGARTY:</p> <p>5 Q. So your opinion is that one particle of talc is enough</p> <p>6 to cause inflammation to lead to ovarian cancer?</p> <p>7 A. I did not say that.</p> <p>8 Q. Well, how much talc must there be introduced in vivo to</p> <p>9 cause ovarian cancer?</p> <p>10 A. I don't know.</p> <p>11 Q. At what -- strike that. What data shows that a woman</p> <p>12 using talc will have the same level of talc exposure to</p> <p>13 her ovarian cells or fallopian tube cells as you used</p> <p>14 in your experiments?</p> <p>15 MS. O'DELL: Object to the form.</p> <p>16 THE WITNESS: So when you want to test the</p> <p>17 effect of any substance in the biology of the body, you</p> <p>18 always start with cell cultures, cell lines, so this is</p> <p>19 pretty accepted standard. Now, the amount of exposure</p> <p>20 in cell lines, because it's direct and it is an</p> <p>21 isolated environment, it is definitely not -- does not</p> <p>22 correlate with the in vivo and how much you will get</p> <p>23 with that exposure. The answer is I don't know how</p> <p>24 much a woman need to be exposed and for how long to</p> <p>25 develop ovarian cancer in response to talcum powder</p>

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<p>1 use. But what I do know, talcum powder induces -- is a</p> <p>2 carcinogenic and induces similar response to the</p> <p>3 profile that we see in pro-oxidant state that we</p> <p>4 extensively characterize in studies in ovarian cancer</p> <p>5 in our laboratory and others.</p> <p>6 BY MR. HEGARTY:</p> <p>7 Q. It induces -- talc induces a similar response to the</p> <p>8 profile that you see in pro-oxidant state in the cell</p> <p>9 cultures that you experimented, correct, experimented</p> <p>10 with, correct?</p> <p>11 MS. O'DELL: Object to the form.</p> <p>12 THE WITNESS: We and others have reported,</p> <p>13 for example, there was a report showing that patients</p> <p>14 with ovarian cancer, their blood is contain high levels</p> <p>15 of pro-oxidants, so that's an indication that ovarian</p> <p>16 cancer -- as a result of getting ovarian cancer your</p> <p>17 blood is -- have high levels of oxidants that we</p> <p>18 characterized. And there are many other studies that</p> <p>19 have shown that -- in vivo that there is an association</p> <p>20 between oxidative stress and the risk of developing</p> <p>21 ovarian cancer.</p> <p>22 BY MR. HEGARTY:</p> <p>23 Q. But none of those studies have shown those effects in</p> <p>24 women using talc, correct?</p> <p>25 A. I don't know.</p>	<p>1 A. The blood of woman with ovarian cancer.</p> <p>2 Q. No studies have reported those same results in the</p> <p>3 blood of women who do not have ovarian cancer but are</p> <p>4 using talc on their bodies, correct?</p> <p>5 A. One more time.</p> <p>6 MS. O'DELL: Object to the form.</p> <p>7 BY MR. HEGARTY:</p> <p>8 Q. No studies have reported those same results in the</p> <p>9 blood of women who do not have ovarian cancer that are</p> <p>10 using talc on their bodies, correct?</p> <p>11 A. I don't know.</p> <p>12 Q. When you say you don't know, what do you mean?</p> <p>13 A. I don't know if there are studies. So you talking --</p> <p>14 are you referring to the study -- I'm only referring to</p> <p>15 patients with ovarian cancer, blood, their blood have</p> <p>16 high oxidants. Now, if normal, talk about normal</p> <p>17 people with normal woman with no ovarian cancer, they</p> <p>18 have -- I don't know, if they use talc they will have</p> <p>19 higher level of oxidants, maybe that's something we</p> <p>20 need to do.</p> <p>21 Q. You don't know -- you're not aware of any data showing</p> <p>22 high oxidant levels in women using talc who do not have</p> <p>23 ovarian cancer?</p> <p>24 A. I would be very much interested to do it.</p> <p>25 Q. You're not aware of any such studies?</p>
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<p>1 Q. You don't know of any such studies?</p> <p>2 A. I don't know if those studies included in their</p> <p>3 population women that who have used talc or not.</p> <p>4 Q. You can't site for me any studies that have shown the</p> <p>5 levels of pro-oxidant or anti-oxidant states that you</p> <p>6 report in your papers in women using talc, correct?</p> <p>7 MS. O'DELL: Object to the form.</p> <p>8 THE WITNESS: I just answered you.</p> <p>9 BY MR. HEGARTY:</p> <p>10 Q. And the answer is no?</p> <p>11 A. No, no, I just -- my previous answer is the same.</p> <p>12 Q. Which is what?</p> <p>13 A. Which I said oxidative -- there have been shown that in</p> <p>14 the blood of a woman with ovarian cancer, there is an</p> <p>15 elevated levels of oxidants, and we're saying that if</p> <p>16 talcum powder induces oxidative stress, alter oxidative</p> <p>17 levels and redox balance by increasing oxidants and</p> <p>18 decreasing anti-oxidants, according to our data, that</p> <p>19 is an indication that it is doing -- manifesting the</p> <p>20 pathogenesis of ovarian cancer.</p> <p>21 Q. The studies you're referring to --</p> <p>22 MR. KLATT: Objection, nonresponsive.</p> <p>23 BY MR. HEGARTY:</p> <p>24 Q. The studies you're referring to have been reported to</p> <p>25 have occurred in women with ovarian cancer, correct?</p>	<p>1 A. No.</p> <p>2 Q. Can you can cite for me anyone in the scientific</p> <p>3 community who has accepted that talcum powder causes</p> <p>4 ovarian cancer by the mechanism that you refer to in</p> <p>5 your report?</p> <p>6 A. Give names?</p> <p>7 Q. Yes.</p> <p>8 A. The co-authors of my manuscript.</p> <p>9 Q. Anyone else?</p> <p>10 A. I'm not aware, this is a very recent study.</p> <p>11 Q. Is it your testimony that the scientific community has</p> <p>12 accepted your opinion as establishing the causal</p> <p>13 mechanism between talc and ovarian cancer?</p> <p>14 MS. O'DELL: Object to the form.</p> <p>15 THE WITNESS: My opinion is not out there</p> <p>16 yet, it's -- this is -- the manuscript is still under</p> <p>17 press, it's in press so it's not really out for the</p> <p>18 readers.</p> <p>19 BY MR. HEGARTY:</p> <p>20 Q. You agree that the medical community has not generally</p> <p>21 accepted that talc use causes ovarian cancer?</p> <p>22 MS. O'DELL: Object to the form.</p> <p>23 THE WITNESS: That they accept --</p> <p>24 BY MR. HEGARTY:</p> <p>25 Q. Yes.</p>

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<p style="text-align: right;">Page 238</p> <p>1 A. Which community you talking about?</p> <p>2 Q. Well, I'm talking about the medical community.</p> <p>3 A. The doctors?</p> <p>4 Q. Doctors.</p> <p>5 A. Researchers?</p> <p>6 Q. Researchers.</p> <p>7 MS. O'DELL: Object to the form.</p> <p>8 BY MR. HEGARTY:</p> <p>9 Q. You agree that the medical community, doctors and</p> <p>10 researchers, have not generally accepted that talc use</p> <p>11 causes ovarian cancer?</p> <p>12 MS. O'DELL: Object to the form.</p> <p>13 THE WITNESS: I don't know, I really don't</p> <p>14 know if they do or not.</p> <p>15 BY MR. HEGARTY:</p> <p>16 Q. You include in your report, in particular in the</p> <p>17 summary of your report over on Page 20, in Paragraphs 5</p> <p>18 and 6 that use of Johnson's Baby Powder can cause</p> <p>19 ovarian cancer, and in Paragraph 6 can worsen the</p> <p>20 prognosis of patients with ovarian cancer, correct?</p> <p>21 A. Correct.</p> <p>22 Q. By what methodology did you use to come to those</p> <p>23 opinions?</p> <p>24 A. Okay. So I have to distinguish between opinions versus</p> <p>25 conclusion from results. So here I cite my personal</p>	<p style="text-align: right;">Page 240</p> <p>1 ovarian cancer is in a hypothesis is a cause and</p> <p>2 effect. My opinion is based on that.</p> <p>3 Q. Are the methods that you used to reach those opinions</p> <p>4 published anywhere?</p> <p>5 A. The method that we used to do -- to test the effect of</p> <p>6 talcum powder on reactive oxygen species, oxidative</p> <p>7 stress, and inflammation is very basic methodology --</p> <p>8 let me finish, please -- basic methodology that is</p> <p>9 known since early 70s or even mid 70s, some of it,</p> <p>10 ELISA is a very well method, very standard method, we</p> <p>11 and others use this all the time. PCR is another well</p> <p>12 established method. Every single study now you see PCR</p> <p>13 all over the places. So what the methodology that we</p> <p>14 employed here is really standard methodology, and I'm</p> <p>15 really surprised that this work that has not been done</p> <p>16 till now.</p> <p>17 Q. Are your opinions based solely on the experiments that</p> <p>18 you did that are set out in your manuscript?</p> <p>19 MS. O'DELL: Object to the form.</p> <p>20 THE WITNESS: My opinion is based on the data</p> <p>21 from this manuscript and this work that I did and,</p> <p>22 also, in published literature that identify the</p> <p>23 pattern, the signature of pro-oxidants in ovarian</p> <p>24 cancer.</p> <p>25</p>
<p style="text-align: right;">Page 239</p> <p>1 opinion. Now, my personal opinion is based on my data</p> <p>2 that I got here. The data that I tested, my</p> <p>3 methodology that I used, and the results of this study</p> <p>4 strongly divert -- pushed my opinion towards this.</p> <p>5 Q. My question is a little bit different, Doctor. By what</p> <p>6 published methodology did you use to reach your</p> <p>7 causation opinions in this case?</p> <p>8 MS. O'DELL: Objection, asked and answered.</p> <p>9 BY MR. HEGARTY:</p> <p>10 Q. For example, are you familiar with the Bradford Hill</p> <p>11 factors or criteria?</p> <p>12 A. Okay, so are you referring to epidemiological studies?</p> <p>13 Q. No, let me back up. Have you ever heard of the</p> <p>14 Bradford Hill factors?</p> <p>15 A. No.</p> <p>16 Q. Is there -- can you cite for me any published</p> <p>17 methodology that you used to look at the data, look at</p> <p>18 your experiments, and come to the opinions that you set</p> <p>19 out in the summary of your report?</p> <p>20 A. Yes. I just said to you that based on my results and</p> <p>21 my previous finding, previous publications with other</p> <p>22 publications from other laboratories, that all agreed</p> <p>23 that a factor that causes inflammation and alter these</p> <p>24 signature factors, the signature for reactive oxygen</p> <p>25 species the way it does it for -- that simulates</p>	<p style="text-align: right;">Page 241</p> <p>1 BY MR. HEGARTY:</p> <p>2 Q. The opinions that you set out in Paragraphs 5 and 6</p> <p>3 have never been published in the peer-reviewed</p> <p>4 literature, correct?</p> <p>5 A. My opinion?</p> <p>6 MS. O'DELL: Object to the form.</p> <p>7 BY MR. HEGARTY:</p> <p>8 Q. Yes. The opinions in Paragraphs 5 and 6 have never</p> <p>9 been published in the peer-reviewed literature,</p> <p>10 correct?</p> <p>11 MS. O'DELL: Object to the form.</p> <p>12 THE WITNESS: I don't understand published</p> <p>13 means.</p> <p>14 BY MR. HEGARTY:</p> <p>15 Q. Well, published in peer-reviewed literature.</p> <p>16 A. As what, as a manuscript?</p> <p>17 Q. In any format. You have never set out the opinions in</p> <p>18 Paragraphs 5 and 6 in any public --</p> <p>19 A. So I read this somewhere else?</p> <p>20 Q. Somewhere else.</p> <p>21 A. I never read this somewhere else.</p> <p>22 Q. So you have never provided your opinions to any of your</p> <p>23 peers in any published article, correct?</p> <p>24 MS. O'DELL: Object to the form.</p> <p>25 THE WITNESS: That's very general. What do</p>

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<p>1 you mean?</p> <p>2 BY MR. HEGARTY:</p> <p>3 Q. Well, my question is the opinions you said in</p> <p>4 Paragraphs 5 and 6 have never been published anywhere,</p> <p>5 correct?</p> <p>6 MS. O'DELL: Object to the form.</p> <p>7 THE WITNESS: No. What I'm saying is these</p> <p>8 are my own, my own opinion, my own writing, writing.</p> <p>9 If someone stole this and published it, I'm not aware</p> <p>10 of that, but this is my language, my words, my opinion,</p> <p>11 and this is based, as I told you and as I mentioned, on</p> <p>12 my data and the results of this study as well as what</p> <p>13 is known for the strong link of ovarian cancer and</p> <p>14 oxidative stress.</p> <p>15 BY MR. HEGARTY:</p> <p>16 Q. Listen to my question. You have never published the</p> <p>17 opinions of yours set out in Paragraphs 5 and 6 of your</p> <p>18 report, correct?</p> <p>19 MS. O'DELL: Object to the form.</p> <p>20 THE WITNESS: I have published that ovarian</p> <p>21 cancer is characterized and ovarian cancer cells</p> <p>22 manifest a pro-oxidant state, I have published that --</p> <p>23 BY MR. HEGARTY:</p> <p>24 Q. Nowhere have you --</p> <p>25 A. -- that can lead to a mechanism to identify --</p>	<p>1 BY MR. HEGARTY:</p> <p>2 Q. By you.</p> <p>3 A. My opinion?</p> <p>4 Q. Yes.</p> <p>5 A. Has never been -- I never said this before, this</p> <p>6 study --</p> <p>7 Q. Correct.</p> <p>8 A. -- is that what you're saying?</p> <p>9 Q. Before your report.</p> <p>10 A. About specifically talc and ovarian cancer?</p> <p>11 Q. Yes.</p> <p>12 A. Yes.</p> <p>13 Q. And you never said in any other writing that use of</p> <p>14 baby powder worsens the prognosis for patients with</p> <p>15 ovarian cancer?</p> <p>16 A. I didn't write about this subject prior to starting</p> <p>17 these experiments.</p> <p>18 Q. Even in your manuscript, you don't include the opinion</p> <p>19 that talcum powder use causes ovarian cancer, correct?</p> <p>20 A. You cannot include opinions in manuscripts.</p> <p>21 Q. That's not my question. My question is that your</p> <p>22 manuscript does not include your opinion that talcum</p> <p>23 powder use causes ovarian cancer, correct?</p> <p>24 A. I answered you.</p> <p>25 MS. O'DELL: Object to the form.</p>
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<p>1 actually, we did identify a pathogenesis, a mechanism</p> <p>2 that involves these specific pro-oxidants to be unique</p> <p>3 mechanism of survival in ovarian cancer.</p> <p>4 Q. Nowhere have you published in any literature that talc</p> <p>5 use can cause ovarian cancer, correct?</p> <p>6 A. Previous to this study?</p> <p>7 Q. This study -- your report has not been published,</p> <p>8 correct?</p> <p>9 A. No.</p> <p>10 Q. It's not been peer reviewed, correct?</p> <p>11 A. No, my report? No.</p> <p>12 Q. What you say in your report that Johnson's Baby Powder</p> <p>13 exposure can cause ovarian cancer has never been</p> <p>14 published in the medical literature, correct?</p> <p>15 MS. O'DELL: Object to the form.</p> <p>16 THE WITNESS: My report has not published</p> <p>17 yet.</p> <p>18 BY MR. HEGARTY:</p> <p>19 Q. The opinions in your report that talcum powder exposure</p> <p>20 can cause ovarian cancer have never been published,</p> <p>21 correct?</p> <p>22 MS. O'DELL: Object to the form, by him or</p> <p>23 others?</p> <p>24 THE WITNESS: Okay. By me?</p> <p>25</p>	<p>1 BY MR. HEGARTY:</p> <p>2 Q. Am I correct?</p> <p>3 MS. O'DELL: Object to the form.</p> <p>4 THE WITNESS: Excuse me, one more time. I</p> <p>5 said in manuscripts you are not allowed to publish to</p> <p>6 draw opinions, in manuscripts you're allowed to draw</p> <p>7 conclusions, so conclusions are different than</p> <p>8 opinions. Conclusions are based solely on the results.</p> <p>9 Opinions, you can say it, if you say it, then if they</p> <p>10 accept it, it's fine, but opinions are based on not</p> <p>11 just the study but your opinion in it, too, based on</p> <p>12 your expertise.</p> <p>13 BY MR. HEGARTY:</p> <p>14 Q. Move to strike as nonresponsive. Doctor, listen to my</p> <p>15 question.</p> <p>16 A. I'm trying.</p> <p>17 Q. Your manuscript does not include your opinion that baby</p> <p>18 powder exposure can cause ovarian cancer, you don't say</p> <p>19 that in your manuscript, correct?</p> <p>20 MS. O'DELL: Object to the form.</p> <p>21 THE WITNESS: I have to look in my</p> <p>22 manuscript.</p> <p>23 BY MR. HEGARTY:</p> <p>24 Q. Doctor, you can't tell me sitting here today --</p> <p>25 A. I'm sorry, I can't remember everything I wrote.</p>

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<p style="text-align: right;">Page 246</p> <p>1 Q. Listen to my question.</p> <p>2 A. Okay.</p> <p>3 Q. Does your manuscript say that Johnson's Baby Powder</p> <p>4 exposure can cause ovarian cancer?</p> <p>5 A. In this specific language?</p> <p>6 Q. Yes.</p> <p>7 A. I have to look.</p> <p>8 Q. Okay. How about do you have to look --</p> <p>9 A. Because you're asking me -- it's not fair, you're</p> <p>10 asking me for a specific language, and I am saying, I'm</p> <p>11 answering back saying that my opinion, it does. Based</p> <p>12 on the results in my manuscript, I concluded that it</p> <p>13 will -- it has increased risk of ovarian cancer, yes,</p> <p>14 somewhere. I have to read. That's what I'm saying. I</p> <p>15 don't remember where I did that.</p> <p>16 Q. Okay.</p> <p>17 A. I have to go and refer to the manuscript. Is that</p> <p>18 fair?</p> <p>19 Q. In Paragraph 6, what do you mean when you say Johnson's</p> <p>20 Baby Powder exposure worsens the prognosis for patients</p> <p>21 with ovarian cancer?</p> <p>22 A. Oh, we're still here? I'm sorry, where --</p> <p>23 Q. Paragraph 6 in your report.</p> <p>24 A. Oh, my report now?</p> <p>25 Q. On Page 21.</p>	<p style="text-align: right;">Page 248</p> <p>1 A. What I know is CA-125 is accepted, it's the only</p> <p>2 accepted marker because that's the only one available,</p> <p>3 although not specific to ovarian cancer, but we use it</p> <p>4 for preliminary following up treatment and diagnosis.</p> <p>5 You can, you know, I can defer to a clinician to answer</p> <p>6 more about that, but what I know is that it is not</p> <p>7 specific to ovarian cancer, endometriosis can increase</p> <p>8 levels of CA-125, some other inflammatory can do that.</p> <p>9 Q. Doctor, listen to my question. My question was that no</p> <p>10 studies have correlated CA-125 levels with ovarian</p> <p>11 cancer risk, correct?</p> <p>12 MS. O'DELL: Object to the form.</p> <p>13 THE WITNESS: Again, I told you, I'm not an</p> <p>14 expert in CA-125 and its clinical utility. What I'm</p> <p>15 trying to tell you is that CA-125 is a marker that</p> <p>16 clinician, OB-GYN oncologist, use to help them diagnose</p> <p>17 and follow up the effect of -- the efficacy of</p> <p>18 treatment. Now, this molecule is a marker of</p> <p>19 inflammation, and we and our results shows clearly that</p> <p>20 talcum powder can induce this inflammatory marker that</p> <p>21 has been clinically used by clinicians to help them</p> <p>22 diagnose and, more importantly, follow up the efficacy</p> <p>23 of treatment.</p> <p>24 BY MR. HEGARTY:</p> <p>25 Q. Dr. Listen, to my question. I'll ask a different</p>
<p style="text-align: right;">Page 247</p> <p>1 A. 21?</p> <p>2 Q. Yes.</p> <p>3 A. Okay, yes, so same, same discussion.</p> <p>4 Q. Listen to my question. My question is what do you mean</p> <p>5 that Johnson's Baby Powder exposure worsens the</p> <p>6 prognosis for patients with ovarian cancer?</p> <p>7 A. Can I answer?</p> <p>8 Q. Yes.</p> <p>9 A. Okay. So based on our results here, we have shown that</p> <p>10 there is a dose response effect of talcum powder on</p> <p>11 these key markers of oxidative stress. That's my</p> <p>12 answer.</p> <p>13 Q. And how do those key -- strike that.</p> <p>14 A. Dose response.</p> <p>15 Q. What is the measure that you apply for worsening the</p> <p>16 prognosis of ovarian cancer?</p> <p>17 A. Is increasing redox balance -- reactive oxygen species,</p> <p>18 tilting the balance, adding more inflammatory markers</p> <p>19 with time with exposure.</p> <p>20 Q. You make reference in your paper to CA-125, when I say</p> <p>21 your paper I'm talking about your report and in your</p> <p>22 manuscript, correct?</p> <p>23 A. Correct.</p> <p>24 Q. No studies have correlated CA-125 levels with ovarian</p> <p>25 cancer risk, correct?</p>	<p style="text-align: right;">Page 249</p> <p>1 question. CA-125 is used only in monitoring disease</p> <p>2 progress in women who have ovarian cancer, correct?</p> <p>3 A. I don't know if that's the only use of it.</p> <p>4 Q. It's not used to diagnose ovarian cancer, correct?</p> <p>5 A. I don't know. I'm not a clinician. I really don't</p> <p>6 know.</p> <p>7 Q. It's not used to determine the cause of ovarian cancer,</p> <p>8 is it?</p> <p>9 A. I don't know, you can ask. I defer these questions to</p> <p>10 a physician, OB-GYN oncologist who can answer you. I</p> <p>11 am a biological chemist, I'm molecular biologist. I</p> <p>12 will answer you within my expertise.</p> <p>13 Q. CA-125 is not used to determine whether women have an</p> <p>14 inflammatory process going on in their bodies, correct?</p> <p>15 MS. O'DELL: Object to the form.</p> <p>16 THE WITNESS: If the levels of CA-125 is</p> <p>17 increased in a woman, my understanding, this is a</p> <p>18 strong indication to an inflammatory process going on,</p> <p>19 yes.</p> <p>20 BY MR. HEGARTY:</p> <p>21 Q. You're talking about in women who have ovarian cancer?</p> <p>22 A. It is also increased in women with, yes, with ovarian</p> <p>23 cancer.</p> <p>24 Q. CA-125 is not used to diagnose whether inflammation is</p> <p>25 going on in women who do not have ovarian cancer?</p>

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<p style="text-align: right;">Page 250</p> <p>1 MS. O'DELL: Object to the form.</p> <p>2 THE WITNESS: Ask the OB-GYN oncologist.</p> <p>3 BY MR. HEGARTY:</p> <p>4 Q. If you look at your manuscript over at Table 2.</p> <p>5 A. Okay.</p> <p>6 Q. What is the mechanism by which talc causes the SNP</p> <p>7 changes or switches you report in this table?</p> <p>8 A. Do I know the mechanism that does that?</p> <p>9 Q. Yes.</p> <p>10 A. Precisely, no, but we have previously published a</p> <p>11 report showing that development of chemoresistance,</p> <p>12 which is an ovarian cancer -- ovarian cancer disease</p> <p>13 that is characterized by even further enhancement of</p> <p>14 oxidative stress, we have published that is associated</p> <p>15 with these SNPs. So the precise mechanism I'm</p> <p>16 proposing that according to my understanding is that</p> <p>17 the higher the oxidative stress level, the more chances</p> <p>18 that you induce these switches, these mutations.</p> <p>19 Q. Can you cite for me any published data showing these</p> <p>20 same or similar type of switches in cells that have</p> <p>21 been exposed to any other substance, whether it's a</p> <p>22 carcinogen or otherwise?</p> <p>23 A. If there is any other substance that induces mutations?</p> <p>24 Q. That induces the kinds of mutations that you report</p> <p>25 here.</p>	<p style="text-align: right;">Page 252</p> <p>1 results in further inhibition of apoptosis and increase</p> <p>2 of survival -- apoptosis, cell death, cell death.</p> <p>3 Q. Doctor, listen to my question. Can you cite for me any</p> <p>4 other substances that have ever been reported to cause</p> <p>5 these kinds of mutations after 72 hours of treatment in</p> <p>6 cell cultures?</p> <p>7 A. I cannot recall now.</p> <p>8 Q. The cell cultures you used are at high oxygen levels,</p> <p>9 are at high oxygen levels than in vivo, correct?</p> <p>10 A. I don't understand the question.</p> <p>11 Q. Well, the cell cultures that you use for purpose of</p> <p>12 your experiments are at higher oxygen levels than these</p> <p>13 cells would experience in vivo, correct?</p> <p>14 A. You mean the whole world of researcher used?</p> <p>15 Q. No, that the cell lines that you used --</p> <p>16 A. The whole world of researcher used, same 20 percent</p> <p>17 oxygen in CO2, okay, it's the same exact standard</p> <p>18 protocol all over the research field. I never heard</p> <p>19 that there's anyone culturing cancer cells in a</p> <p>20 different environment than -- we have done many work</p> <p>21 looking at the effect of hypoxia and hyperoxia on the</p> <p>22 expression of these markers in normal cells. We have</p> <p>23 done several, I have published several publications.</p> <p>24 Let me help you with this information.</p> <p>25 Q. Let me withdraw the question, Doctor. You're going on</p>
<p style="text-align: right;">Page 251</p> <p>1 A. In the literature, there are several, many substance</p> <p>2 that have been associated with certain mutations in the</p> <p>3 DNA, yes.</p> <p>4 Q. Well, let me ask it a different way. Can you cite for</p> <p>5 me any substance that has been shown to cause -- or</p> <p>6 strike that, let me back up. Is it your testimony that</p> <p>7 what you're reporting here -- that you're reporting</p> <p>8 here that talc causes mutations in DNA in 72 hours?</p> <p>9 MS. O'DELL: Object to form.</p> <p>10 THE WITNESS: My results indicates that if</p> <p>11 you treat cells with talcum powder for 72 hours and</p> <p>12 look for whatever showed positive here, some showed</p> <p>13 negative, that there is an induction of this specific</p> <p>14 mutation in response to the treatment of talc.</p> <p>15 BY MR. HEGARTY:</p> <p>16 Q. Can you cite for me any other substance that's ever</p> <p>17 been reported to cause these kinds of mutations after</p> <p>18 72 hours of treatment in cell cultures?</p> <p>19 A. I cannot recall now. I'm sure I can find them. There</p> <p>20 are many in the literature, by the way, but I am citing</p> <p>21 you specifically my work that I have done in my</p> <p>22 laboratory that was shown that when oxidative stresses</p> <p>23 further -- increased and enhanced, we develop some of</p> <p>24 these mutations, cell would acquire these mutations in</p> <p>25 certain key pro-oxidants and anti-oxidant enzymes that</p>	<p style="text-align: right;">Page 253</p> <p>1 not answering my question.</p> <p>2 A. I'm trying.</p> <p>3 Q. No, you're not answering my question.</p> <p>4 A. I'm answering what I understood.</p> <p>5 Q. The tests you conducted, the experiments you conducted</p> <p>6 are higher oxygen levels than cells are exposed to in</p> <p>7 vivo, correct?</p> <p>8 A. I'm trying to -- no, it's not, I'm trying to explain it</p> <p>9 to you.</p> <p>10 Q. They're not higher levels?</p> <p>11 A. What do you mean by in vivo? In blood?</p> <p>12 Q. Cells inside the body.</p> <p>13 A. It's PO20, it's the same.</p> <p>14 Q. So the oxygen levels of the cells in the body are at</p> <p>15 the same level as the oxygen levels of the cells in</p> <p>16 your cell --</p> <p>17 MS. O'DELL: Objection.</p> <p>18 THE WITNESS: No, I said the oxygen levels in</p> <p>19 the circulation in vivo is the same as the oxygen level</p> <p>20 in the media where we culture cells. This is where we</p> <p>21 get it from, not from a dream, we got it from there.</p> <p>22 Now, if you're referring to the oxygen levels that</p> <p>23 cells are exposed to in tissues --</p> <p>24 BY MR. HEGARTY:</p> <p>25 Q. Yes.</p>

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<p style="text-align: right;">Page 254</p> <p>1 A. Nobody knows that. There's only one single report that 2 says in a physiology book where I was a student at that 3 time, they're saying 6 percent, 5 to 6 percent. But 4 that is inside the tissues without the circulation. 5 Now, you have to remember all cells get food from 6 circulation, so you will have eventually enough oxygen 7 that you're getting for. So this is within my 8 expertise, I've done many, many work on this. 9 Q. The glucose levels in your cell cultures are also 10 higher than what the cells would experience in the 11 body, correct? 12 A. The glucose level that we use in the media, again, is 13 standard with all of any researcher on the face of this 14 earth use. It is standard accepted levels. So if you 15 are trying to make that what we use is different than 16 in vivo, it could be, but this is what agreed upon in 17 the research community. 18 Q. Move to strike as nonresponsive. Listen to my 19 question, Doctor. Are the glucose levels in cell 20 cultures that you performed for purposes of your 21 experiments higher than the glucose levels of the cells 22 inside the body? 23 MS. O'DELL: Objection, form, asked and 24 answered. 25 THE WITNESS: I don't know.</p>	<p style="text-align: right;">Page 256</p> <p>1 that -- why do your control cell lines have such high 2 levels of Caspase? 3 A. So it is known, as we have previously published and all 4 other researcher who was interested in this, that 5 cancer cells have almost shut down their apoptosis, 6 because they have to increase their survival. So when 7 you compare apoptosis of any cancer cell from any type, 8 okay, you will find their apoptosis is way, way lower 9 than normal cells. Normal cells, they have -- they 10 divide, they die, they reproduce, all the times. 11 Cancer cells don't like to die, they love to survive, 12 so their apoptotic pathways are not normal. 13 Q. So then what you're reporting here are as to control 14 cells, controls in ovarian cancer cells? 15 A. No, no. The controls here are macrophages, it's normal 16 ovarian epithelial, and fallopian tube epithelial. 17 Q. Why are your -- the Caspase levels higher in your 18 controls than in your talc treated cells? 19 A. Maybe I missed the question. I just answered that, 20 right? 21 Q. Well, I don't think you answered my question. 22 A. Well, let me try to understand what you want. 23 Q. Well, the Figure 6 shows that the controls have higher 24 levels of Caspase-3 than the talc treated cells, 25 correct?</p>
<p style="text-align: right;">Page 255</p> <p>1 BY MR. HEGARTY: 2 Q. Aren't the cells that you experiment with in a 3 hyperglycemic state? 4 A. I just told I don't know. 5 Q. Can high glucose levels cause an increase in reactive 6 oxygen species? 7 A. Okay, so -- 8 Q. Can they or can't they? 9 MS. O'DELL: He gets to -- you asked the 10 question, he -- 11 THE WITNESS: There is no yes or no answer. 12 BY MR. HEGARTY: 13 Q. Okay. I withdraw the question. 14 A. If you are trying to take me to say "yes" or "no" to 15 something that I have explanation for, I think you 16 should just listen to my explanation. I am actually -- 17 this field, this field is my field, and I will tell 18 you, okay, I'll tell you that the cancer cells are -- 19 their metabolism is different than normal cells because 20 their uptake, their uptake of glucose, they don't go in 21 aerobic metabolism, they go anaerobic metabolism, so it 22 doesn't matter how much glucose you give them, it 23 doesn't really. 24 Q. If you look over on Page -- Figure 6 of your 25 manuscript, why do your normal cell lines -- strike</p>	<p style="text-align: right;">Page 257</p> <p>1 MS. O'DELL: Object to the form. Do you need 2 to see that in color, Doctor? Would that help? 3 THE WITNESS: Yes, please. 4 MS. O'DELL: (Handing.) 5 THE WITNESS: So here, the control cells, so 6 let's look at the normal cells -- okay, the normal 7 cells -- well, that's the whole idea, the whole 8 objective of this research, the whole point, that if 9 you treat with talcum powder, talcum powder induces -- 10 enhances oxidative stress that stimulate apoptosis 11 pathways and shut them down, inhibit them. So in the 12 treated -- in the treated, they should be lower than 13 the untreated. 14 BY MR. HEGARTY: 15 Q. What are the normal Caspase levels in a normal cell? 16 A. It's different for different cell types, but normal 17 cell types, normal cells always have way higher 18 apoptosis than cancer cells. This is well known 19 phenomenon. 20 Q. At the levels you report in Figure 6? 21 A. It depends on the cells, again, I said, it depends on 22 the cell type. So maybe other people in their work, 23 they have different response. But it is accepted that 24 is cancer cells, all cancer cells, no exception, have 25 lower, way lower apoptosis than normal cells. I</p>

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<p style="text-align: right;">Page 258</p> <p>1 published previously that lower apoptosis in cancer 2 cells is due to overexpression of nitric oxide 3 synthase, which is a pro-oxidant, and myeloperoxidase, 4 which is another pro-oxidant, and they work together to 5 nitrilotate Caspase-3, that's what we're measuring 6 here, and shutting down its activity and its apoptosis. 7 Q. The type of SNP changes that you report in your 8 manuscript can be detected by Sanger sequencing, 9 correct? 10 A. Now, that's -- we're moving from this? 11 Q. Yes. 12 A. Okay, sorry, I thought we were still here. 13 Q. Different question. 14 A. Okay. Give me a -- 15 Q. Can you answer my question? 16 A. What's the question? 17 Q. The type of SNP changes that you report in your 18 manuscript can be detected by Sanger sequencing, 19 correct? 20 A. Yes. 21 Q. Did you use this method? 22 A. No. 23 Q. Have you ever used Sanger sequencing to detect changes 24 in SNPs or to analyze SNPs? 25 A. You mean gene mutations?</p>	<p style="text-align: right;">Page 260</p> <p>1 A. I believe we have published a different study with the 2 same subject. You want me to look for it? 3 Q. Not right now. 4 A. Okay, but we did publish that before. 5 Q. Did you measure changes in peroxide levels as part of 6 your experiment? 7 A. Excuse me, one more time. 8 Q. Did you measure changes in peroxide levels as part of 9 your experiments? 10 A. What is peroxide level? 11 Q. Hydrogen peroxide level. 12 A. Oh, H2O2? 13 Q. Yes. 14 A. Indirectly, yes. 15 Q. When you sat indirectly, what do you mean? 16 A. Because it's the substrate for an enzyme, so it's an 17 enzymatic reaction. 18 Q. Did you find any changes in hydrogen peroxide levels in 19 the talc treated cells? 20 A. We didn't measure the actual H2O2 levels in these 21 cells. We did measure the catalase activity that turns 22 H2O2 to H2O, which is the turnover. 23 Q. Have you ever measured hydrogen peroxide levels in 24 these types of studies? 25 A. Have I measured -- H2O2, I don't think so, directly,</p>
<p style="text-align: right;">Page 259</p> <p>1 Q. Gene mutations, yes. 2 A. So the answer is nowadays no one does this from the 3 research community. There are core facilities, labs 4 that you send to. You don't need -- I don't believe 5 people will in their laboratories that sit down and do 6 experiments that takes forever. They just rather send 7 it to this lab, we have -- every university have this, 8 we have a core facility that you can send to, and then 9 they will do it for you and they will give you the 10 results, so you don't need to do it yourself. 11 Q. Is Sanger sequencing considered more accurate than 12 TaqMan? 13 A. Pretty much I think they are the same level. 14 Q. And you said you have used Sanger sequencing before? 15 A. No, personally no. 16 Q. What is the mechanism by which the SNP change, as you 17 say, talc induces cause the redox changes that you 18 report in your study? 19 A. So talcum powder treatment increase, induces the 20 specific mutations that are associated with altering 21 the activity of the redox, the key oxidant enzymes that 22 the results will be altering the oxidated balance. 23 Q. And what studies show that? 24 A. This study. 25 Q. What studies besides your study, your manuscript?</p>	<p style="text-align: right;">Page 261</p> <p>1 directly H2O2 levels, no. 2 Q. You've referred earlier to the fact that you have 3 published abstracts that have talked about the results 4 of the experiments we've marked as -- let me start 5 again. You mentioned earlier that you published the 6 results of the experiments documented in lab notebooks 7 marked as Exhibits 2 and 3 in the past, correct? 8 MS. O'DELL: Object to the form. 9 BY MR. HEGARTY: 10 Q. You didn't get that question? 11 A. No. 12 Q. You mentioned you had published the results of your 13 experiments that we've been talking about here today in 14 abstracts, correct? 15 A. There was an SRI abstract that I presented at the SRI 16 meeting March of '18, last year, that was reflected or 17 involved this initial work that we did with Fisher with 18 PCR. 19 Q. And you also presented at an SGO meeting, correct? 20 A. I believe I did. 21 Q. In either case did you disclose that you were a 22 consultant for plaintiffs counsel in litigation, 23 correct? 24 A. When you submit the abstract, they will not let you 25 proceed until you -- yes, the answer is yes.</p>

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<p style="text-align: right;">Page 262</p> <p>1 Q. The answer is that you did disclose?</p> <p>2 A. I did disclose, yes.</p> <p>3 Q. It's not included -- the disclosure's not included in</p> <p>4 the abstracts, correct.</p> <p>5 A. They don't have it like that, no.</p> <p>6 Q. When you presented the abstracts, did this involve</p> <p>7 standing there in front of a poster?</p> <p>8 A. Yes.</p> <p>9 Q. And did people come up and talk to you about your</p> <p>10 posters?</p> <p>11 A. Yes.</p> <p>12 Q. Did you identify yourself as an expert in litigation</p> <p>13 involving talc and ovarian cancer?</p> <p>14 MS. O'DELL: Object to the form.</p> <p>15 THE WITNESS: No one asked me.</p> <p>16 BY MR. HEGARTY:</p> <p>17 Q. Did you tell them that you were?</p> <p>18 A. I didn't volunteer anything.</p> <p>19 Q. Have you provided your opinions in this case to anyone</p> <p>20 outside of plaintiff's counsel or your colleagues on</p> <p>21 the manuscript?</p> <p>22 MS. O'DELL: Object to the form.</p> <p>23 THE WITNESS: So you just asked me if I</p> <p>24 discussed this with people that I presented to in the</p> <p>25 whole meeting.</p>	<p style="text-align: right;">Page 264</p> <p>1 specific.</p> <p>2 Q. Are your opinions in this case premised on talc</p> <p>3 containing asbestos?</p> <p>4 A. (Witness shakes head from side to side.) I don't know,</p> <p>5 no, my opinion has nothing to do with that.</p> <p>6 Q. Are your opinions in any way based on talc having heavy</p> <p>7 metals in them?</p> <p>8 A. No.</p> <p>9 Q. Is it your opinion that talc without asbestos or</p> <p>10 without any other constituents can cause ovarian</p> <p>11 cancer?</p> <p>12 A. The one that I got in this bottle from J & J, yes.</p> <p>13 Q. Is it your opinion, Doctor, that your studies or your</p> <p>14 experiments show that talc increases cellular</p> <p>15 proliferation and decreases apoptosis?</p> <p>16 A. I'm sorry, one more time, one more time.</p> <p>17 Q. Sure. Is it your opinions or is it your opinion that</p> <p>18 talc use increases cellular proliferation and decreases</p> <p>19 apoptosis in normal ovarian cells?</p> <p>20 A. My finding clearly indicates that if you treat cells</p> <p>21 with talcum powder, the results of this treatment is a</p> <p>22 dose response increase in proliferation and decrease in</p> <p>23 apoptosis, yes.</p> <p>24 Q. In normal ovarian cells?</p> <p>25 A. In normal and in cancer cells.</p>
<p style="text-align: right;">Page 263</p> <p>1 BY MR. HEGARTY:</p> <p>2 Q. Well, let me ask it a different way because I can see</p> <p>3 where you're confused. We talked about your opinions</p> <p>4 that talc can cause ovarian cancer.</p> <p>5 A. Oh, so we're going back here now?</p> <p>6 Q. Yes, we're going back to your opinions.</p> <p>7 A. Okay.</p> <p>8 Q. Have you ever told anyone at the medical school, at</p> <p>9 Wayne State Medical School that talc use can cause</p> <p>10 ovarian cancer?</p> <p>11 A. I don't recall.</p> <p>12 Q. Have you ever told anyone at Wayne State School of</p> <p>13 Medicine that talc use can worsen the prognosis of</p> <p>14 ovarian cancer?</p> <p>15 A. Again, I don't recall. I don't remember.</p> <p>16 Q. Can you tell for me, when you say you can't recall</p> <p>17 having had a discussion with anyone --</p> <p>18 A. I can't remember that I said that.</p> <p>19 Q. Can you cite for me anyone that you've spoken with at</p> <p>20 the Wayne State School of Medicine where you've told</p> <p>21 them your opinions that talc use can cause ovarian</p> <p>22 cancer or can worsen ovarian cancer?</p> <p>23 A. Other than the co-authors of this study?</p> <p>24 Q. Yes.</p> <p>25 A. I haven't talked to anyone, in my school, to be</p>	<p style="text-align: right;">Page 265</p> <p>1 Q. Cell proliferation does not mean cancer, correct?</p> <p>2 A. Cell -- increase in cell proliferation beyond normal is</p> <p>3 a highlight of cancer cells.</p> <p>4 Q. There is cell proliferation in normal cells in the</p> <p>5 absence of cancer, correct?</p> <p>6 A. So good question. So cell -- normal cells in response</p> <p>7 to agents can be temporally transit induces their</p> <p>8 proliferation, but they come back. Cancer cells don't</p> <p>9 come back. They will proliferate forever.</p> <p>10 Q. But you agree that cell proliferation does not equate</p> <p>11 to cancer?</p> <p>12 A. Okay, I am answering you. According to my knowledge,</p> <p>13 transit, transit or let's say temporary or initial</p> <p>14 induction of proliferation, it is a normal response of</p> <p>15 all normal cells to agents. If this response</p> <p>16 continues, now, this is a hallmark of cancer. It is</p> <p>17 indication that this cell is going that route.</p> <p>18 Q. In the tests you conducted, the results would be</p> <p>19 considered an acute response to talc, correct?</p> <p>20 MS. O'DELL: Object to the form.</p> <p>21 THE WITNESS: Yes, I understand. In cell</p> <p>22 culture you cannot distinguish between acute response</p> <p>23 versus chronic response. In cell culture you cannot do</p> <p>24 that. So in cell culture it is a response.</p> <p>25 Q. That you cannot say would occur in a chronic way?</p>

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<p style="text-align: right;">Page 266</p> <p>1 MS. O'DELL: Objection.</p> <p>2 THE WITNESS: I don't know if this -- okay,</p> <p>3 here's the question, so the answer is you expose cells,</p> <p>4 talcum powder, cells go crazy and they increase their</p> <p>5 proliferation. If they don't come back, so that's the</p> <p>6 response to the acute, if they don't come back and</p> <p>7 there is talcum powder particles in there, and they</p> <p>8 keep provoking the inflammation, that transit goes into</p> <p>9 chronic inflammation. I'm trying to think of</p> <p>10 simulation to in vivo, but in cell culture you cannot</p> <p>11 tell.</p> <p>12 BY MR. HEGARTY:</p> <p>13 Q. Can you cite for me any studies showing increase in</p> <p>14 cell proliferation in the presence of talc in vivo?</p> <p>15 MS. O'DELL: Objection, form.</p> <p>16 THE WITNESS: Very complicated question,</p> <p>17 break it down for me, please.</p> <p>18 BY MR. HEGARTY:</p> <p>19 Q. I don't know if I can break it down. Can you cite for</p> <p>20 me any study showing an increase in cell proliferation</p> <p>21 in the presence of talc in women using talc?</p> <p>22 A. How would you measure --</p> <p>23 MS. O'DELL: Objection.</p> <p>24 THE WITNESS: How would you measure cell</p> <p>25 proliferation in woman?</p>	<p style="text-align: right;">Page 268</p> <p>1 contaminant decrease in apoptosis is a hallmark of</p> <p>2 ovarian cancer.</p> <p>3 BY MR. HEGARTY:</p> <p>4 Q. Not my question, Doctor. My question was are there any</p> <p>5 studies showing that an increase in cell proliferation,</p> <p>6 as you showed in your experiments, is associated with</p> <p>7 an increase in ovarian cancer risk?</p> <p>8 MS. O'DELL: Object to the form, asked and</p> <p>9 answered.</p> <p>10 THE WITNESS: Okay, so you're asking if there</p> <p>11 are reports showing that there is the increased</p> <p>12 proliferation is associated with increased cancer risk?</p> <p>13 BY MR. HEGARTY:</p> <p>14 Q. Correct.</p> <p>15 A. Okay, again, I'm answering, the answer is I don't know</p> <p>16 because I believe that you cannot measure proliferation</p> <p>17 in vivo.</p> <p>18 Q. Are there any studies showing that a decrease in</p> <p>19 apoptosis, as you showed in your experiments, is</p> <p>20 associated with an increase in ovarian cancer risk?</p> <p>21 A. So I would respond the same way. I would say, again,</p> <p>22 these -- to determine apoptosis, you have to isolate</p> <p>23 the cells from the patient outside and do cell culture</p> <p>24 and look into that, so I'm not aware.</p> <p>25 Q. Are there any studies showing either an increase in</p>
<p style="text-align: right;">Page 267</p> <p>1 BY MR. HEGARTY:</p> <p>2 Q. Well, I'm asking you if you're aware of any such</p> <p>3 studies?</p> <p>4 A. I'm answering. I said how would you measure that? I'm</p> <p>5 not aware, I don't know.</p> <p>6 Q. Are you aware of any studies showing a decrease in</p> <p>7 apoptosis in the cells of women using talc?</p> <p>8 A. Again, these studies only done in cell culture. You</p> <p>9 cannot do this in vivo. This has to be isolated from</p> <p>10 the woman of ovarian cancer who use talc, who didn't</p> <p>11 use talc, and then you look at their cells in culture</p> <p>12 to determine those parameters. You cannot determine</p> <p>13 those in vivo. Although there are pathology they can</p> <p>14 do, they can do proliferation markers like KI67, it's</p> <p>15 been done, it's all over, there are indications, but</p> <p>16 they cannot do this in vivo. This has been done in</p> <p>17 tissues. With woman, yes, you can do it, but to do</p> <p>18 that you have to isolate the cells and then look at the</p> <p>19 cell response.</p> <p>20 Q. Are there any studies showing that an increase in cell</p> <p>21 proliferation, as you showed in your experiments, is</p> <p>22 associated with an increase in ovarian cancer risk?</p> <p>23 MS. O'DELL: Object to the form.</p> <p>24 THE WITNESS: There are several studies that</p> <p>25 shows that enhanced proliferation and reduce with</p>	<p style="text-align: right;">Page 269</p> <p>1 cell proliferation or a decrease in apoptosis as you</p> <p>2 have shown in your report in women using talc?</p> <p>3 MS. O'DELL: Object to the form.</p> <p>4 THE WITNESS: I'm not aware of that.</p> <p>5 MR. HEGARTY: Why don't we take a break, go</p> <p>6 off the record. I need to converse with counsel for</p> <p>7 Imerys about how much time that he needs for his</p> <p>8 questioning.</p> <p>9 MS. O'DELL: Okay.</p> <p>10 THE VIDEOGRAPHER: Going off the record at</p> <p>11 5:04 p.m.</p> <p>12 (A short recess was taken.)</p> <p>13 THE VIDEOGRAPHER: We're back on the record at</p> <p>14 5:26 p.m.</p> <p>15 BY MR. HEGARTY:</p> <p>16 Q. Doctor, in your cell experiments, how did you control</p> <p>17 for cross-contamination?</p> <p>18 MS. O'DELL: I'm sorry, I didn't hear, for</p> <p>19 cross-contamination?</p> <p>20 MR. HEGARTY: Yes.</p> <p>21 THE WITNESS: Cross-contamination, so cross-</p> <p>22 contamination from each -- from the cells that I used?</p> <p>23 BY MR. HEGARTY:</p> <p>24 Q. How did you control to keep from mixing up of samples?</p> <p>25 MS. O'DELL: Object to the form.</p>

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<p style="text-align: right;">Page 270</p> <p>1 THE WITNESS: I'm not sure that I understood</p> <p>2 your question. Are you referring to mixing the two</p> <p>3 cell lines, for example?</p> <p>4 BY MR. HEGARTY:</p> <p>5 Q. Yes.</p> <p>6 A. With each other?</p> <p>7 Q. Correct.</p> <p>8 A. That's not possible.</p> <p>9 Q. Why is that not possible?</p> <p>10 A. Because each cell line is done in one experiment</p> <p>11 treatment with all the doses on its own.</p> <p>12 Q. What about mixing normal cells with the -- I'm sorry,</p> <p>13 how about mixing control cells with the treated cells,</p> <p>14 is that possible?</p> <p>15 A. What do you mean by control cells, not treated?</p> <p>16 Q. Not treated?</p> <p>17 A. So, also, that's not possible because you -- we divide,</p> <p>18 we grow the cells, one lot, one lot of cells, and then</p> <p>19 we aliquot, we put 1 million cells here, 1 ml cells</p> <p>20 here, and then we separate them and give the different</p> <p>21 doses for each cell lines. And the -- this thing, the</p> <p>22 treatment was repeated for PCR for RNA, for protein for</p> <p>23 ELISA, for proliferation assays, so it's not possible</p> <p>24 that there is a mix between treated and untreated.</p> <p>25 Q. Do you know what positive and negative controls are in</p>	<p style="text-align: right;">Page 272</p> <p>1 There's two different controls, okay. We did negative</p> <p>2 and positive for the treatment, so this is with talc,</p> <p>3 this is with no talc. For the markers, for the</p> <p>4 markers, we have standards that with serial dilution</p> <p>5 tells you exactly how much you expect to get in there.</p> <p>6 Q. Did you use a negative control in your cell studies</p> <p>7 with a known inert substance?</p> <p>8 MS. O'DELL: Object to the form.</p> <p>9 THE WITNESS: That's not a negative control</p> <p>10 to me, it does not apply to my study. The only</p> <p>11 negative control that applies to my study is talc with</p> <p>12 no talc.</p> <p>13 BY MR. HEGARTY:</p> <p>14 Q. How can you rule out in your studies that any</p> <p>15 particulate you added to the cell cultures would cause</p> <p>16 the same thing?</p> <p>17 A. Again, we tested several fold. So our study does not</p> <p>18 qualify for a positive positive control that you're</p> <p>19 referring to or a negative negative control.</p> <p>20 Q. How are you able to rule out that glass beads wouldn't</p> <p>21 cause the same --</p> <p>22 A. Glass beads?</p> <p>23 Q. -- effect? How are you able to rule out that some</p> <p>24 inert part, other part -- strike that. How would you</p> <p>25 rule out that any particle wouldn't cause the same</p>
<p style="text-align: right;">Page 271</p> <p>1 cell studies?</p> <p>2 A. I do.</p> <p>3 Q. You did not use positive and negative controls in your</p> <p>4 cell studies, correct?</p> <p>5 A. Not correct.</p> <p>6 Q. Well, I'm going to define positive controls as applying</p> <p>7 a known cancer causing substance to the cells. Is that</p> <p>8 your understanding of positive control?</p> <p>9 A. Not in these studies.</p> <p>10 Q. I'm talking about generally.</p> <p>11 A. Generally a positive control that something that you</p> <p>12 know it's there and you're looking for it.</p> <p>13 Q. What is in general terms a negative control?</p> <p>14 A. A negative control, something you're not looking for,</p> <p>15 it is not there.</p> <p>16 Q. Well --</p> <p>17 A. So there is negative negative and there is positive</p> <p>18 positive.</p> <p>19 Q. Did you do any of your tests -- I'm sorry, did you do</p> <p>20 any of your experiments using any substances known to</p> <p>21 be a carcinogen?</p> <p>22 A. One more time. I will answer you. The answer is no,</p> <p>23 okay, but you're referring to -- so there are two</p> <p>24 different controls, negative and positive for the</p> <p>25 target, and negative and positive for the treatment.</p>	<p style="text-align: right;">Page 273</p> <p>1 effect that you saw in your studies?</p> <p>2 A. Very simple, the untreated didn't show that.</p> <p>3 Q. Well, how do you rule out that the treated cells would</p> <p>4 react the same way regardless of what you put on them?</p> <p>5 In other words, if you put -- how did you rule out that</p> <p>6 any particle would not cause the same thing if you</p> <p>7 mixed it with DMSO and applied it to talc?</p> <p>8 A. Yeah, so we did DMSO control.</p> <p>9 MS. O'DELL: Object to the form.</p> <p>10 THE WITNESS: So we did -- took the talc,</p> <p>11 mixed it with DMSO, took the DMSO, treat the cells with</p> <p>12 DMSO alone and with DMSO and talc. So if the effect</p> <p>13 was due to DMSO, you would see the response in the</p> <p>14 untreated cells.</p> <p>15 BY MR. HEGARTY:</p> <p>16 Q. Would cornstarch cause the same result?</p> <p>17 A. I did not test it.</p> <p>18 Q. How can you rule out that cornstarch wouldn't do the</p> <p>19 same thing if applied to cells?</p> <p>20 MS. O'DELL: Object to the form.</p> <p>21 THE WITNESS: I didn't rule anything, I did</p> <p>22 not test it.</p> <p>23 BY MR. HEGARTY:</p> <p>24 Q. Does cornstarch cause cancer?</p> <p>25 A. I did not test it.</p>

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<p>1 Q. Well, in your opinion, does --</p> <p>2 A. In my opinion?</p> <p>3 Q. Yes.</p> <p>4 A. From my information? I don't think so.</p> <p>5 Q. Could you have tested cornstarch in the same way you</p> <p>6 tested talc?</p> <p>7 A. Could I have?</p> <p>8 Q. Yes.</p> <p>9 A. I can use my methodology to test that, yes, of course.</p> <p>10 Q. And are you able to say that no other particle exposed</p> <p>11 in the same way that you would expose cells with talc</p> <p>12 would not have caused the same result?</p> <p>13 MS. O'DELL: Object to the form.</p> <p>14 THE WITNESS: I already answered.</p> <p>15 BY MR. HEGARTY:</p> <p>16 Q. What's your answer?</p> <p>17 A. Okay, I'm saying that in this study, the way this</p> <p>18 study's designed to look at the effect with talc,</p> <p>19 without talc, if you are looking at one marker only,</p> <p>20 then maybe we should consider more, but we're looking</p> <p>21 at several markers at several levels. So we're looking</p> <p>22 at mRNA DNA mRNA protein activity, several levels here.</p> <p>23 Q. But you cannot say that cornstarch wouldn't do the same</p> <p>24 thing as talc did in your experiments?</p> <p>25 A. I did not study cornstarch, so I cannot tell you.</p>	<p>1 A. I didn't say I did not agree. I said I am not -- I</p> <p>2 don't have any molecular data in my laboratory to</p> <p>3 support the direct effect of talcum powder on my</p> <p>4 markers that I studied in my lab, and I would like to</p> <p>5 do that.</p> <p>6 Q. When in relation to the first call that you had with</p> <p>7 Miss Thompson did you agree to serve as a consultant</p> <p>8 for Beasley Allen?</p> <p>9 A. I think it was like October sometime.</p> <p>10 Q. And in between the time of the first call and October,</p> <p>11 did you have any additional calls with anyone from --</p> <p>12 A. We had the meeting September 7, if I remember.</p> <p>13 Q. At the time of that meeting, had you agreed to serve as</p> <p>14 a consultant for Beasley Allen?</p> <p>15 A. I agreed in principle to serve as a consultant for what</p> <p>16 I am an expert in, which is oxidative stress and</p> <p>17 ovarian cancer, and I promised to run data, do some</p> <p>18 work, because I wanted to find out if there is</p> <p>19 molecular evidence to support the effect of talcum</p> <p>20 powder on the markers that I study, which are the</p> <p>21 markers of risk of ovarian cancer.</p> <p>22 Q. And you agreed to serve as a consultant, at least as to</p> <p>23 oxidative stress and ovarian cancer, as of the time of</p> <p>24 the meeting in September?</p> <p>25 MS. O'DELL: Object as to form.</p>
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<p>1 Q. We talked earlier at the beginning of the deposition</p> <p>2 about you receiving a call from Miss Thompson, correct?</p> <p>3 A. Yes.</p> <p>4 Q. Do you know how she came to call you in the first</p> <p>5 place?</p> <p>6 A. From according to her?</p> <p>7 Q. Yes.</p> <p>8 A. Or according to me?</p> <p>9 Q. Well, what is your understanding as to why she</p> <p>10 initiated that initial call, how she came to get your</p> <p>11 name?</p> <p>12 A. She found me on what do you call it -- Med Web, because</p> <p>13 I had published this review article in this very</p> <p>14 prestigious journal called OB-GYN Oncology. Want to</p> <p>15 let me finish?</p> <p>16 MS. O'DELL: Yes, you may finish.</p> <p>17 BY MR. HEGARTY:</p> <p>18 Q. Are you finished?</p> <p>19 A. No.</p> <p>20 Q. How much more is there?</p> <p>21 A. Okay --</p> <p>22 MS. O'DELL: You may finish, Doctor.</p> <p>23 BY MR. HEGARTY:</p> <p>24 Q. You mentioned that you did not agree to serve as a</p> <p>25 consultant at the time of the first call, correct?</p>	<p>1 THE WITNESS: I agreed to serve as a</p> <p>2 consultant for oxidative stress and ovarian cancer in</p> <p>3 actually the first phone call.</p> <p>4 BY MR. HEGARTY:</p> <p>5 Q. With regard to your work in this litigation, have you</p> <p>6 reviewed any of the expert reports of any other experts</p> <p>7 designated by plaintiffs?</p> <p>8 A. Barely I remember one or two, just briefly. I don't</p> <p>9 even remember names.</p> <p>10 Q. Have you reviewed, for purposes of your opinions in</p> <p>11 this case, anything that you did not bring with you</p> <p>12 here today?</p> <p>13 A. Good question, no.</p> <p>14 Q. Are there any necessary changes to your expert report?</p> <p>15 A. As --</p> <p>16 Q. As you sit here today.</p> <p>17 A. As of now today, no.</p> <p>18 Q. Have you ever had your deposition taken before?</p> <p>19 A. No.</p> <p>20 Q. Have you ever been designated to serve as an expert</p> <p>21 witness in any lawsuit?</p> <p>22 A. No.</p> <p>23 Q. You are not a medical doctor, correct?</p> <p>24 A. No.</p> <p>25 Q. You brought with you a copy of your updated CV; is that</p>

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<p style="text-align: right;">Page 278</p> <p>1 correct?</p> <p>2 A. Correct.</p> <p>3 Q. Yes. I'm going to mark this Exhibit Number 18.</p> <p>4 SAED DEPOSITION EXHIBIT NUMBER 18,</p> <p>5 CURRICULUM VITAE,</p> <p>6 WAS MARKED BY THE REPORTER</p> <p>7 FOR IDENTIFICATION</p> <p>8 BY MR. HEGARTY:</p> <p>9 Q. The CV you brought with you today, is that your current</p> <p>10 curriculum vitae?</p> <p>11 A. Yes.</p> <p>12 Q. Okay. Thank you. You don't treat ovarian cancer</p> <p>13 patients, correct?</p> <p>14 A. I am not an M.D., I'm not a medical doctor.</p> <p>15 Q. Do you teach any courses?</p> <p>16 A. In the university, yes.</p> <p>17 Q. What courses do you teach?</p> <p>18 A. They are listed here in my CV.</p> <p>19 Q. Listed in your CV?</p> <p>20 A. Yes.</p> <p>21 Q. Do you teach medical students?</p> <p>22 A. I do.</p> <p>23 Q. Those would be listed in your CV?</p> <p>24 A. Everything I teach is listed here.</p> <p>25 Q. What percentage of your time is spent teaching?</p>	<p style="text-align: right;">Page 280</p> <p>1 and ovarian cancer for purposes of developing your</p> <p>2 opinions in this case?</p> <p>3 A. To my best knowledge, yes, only like three papers out</p> <p>4 there.</p> <p>5 Q. I'm sorry?</p> <p>6 A. There are only like three papers out there that I can</p> <p>7 remember.</p> <p>8 Q. Did you do a search yourself for literature concerning</p> <p>9 talc and ovarian cancer?</p> <p>10 A. Yes.</p> <p>11 Q. What search engines or tools did you use?</p> <p>12 A. I used what I always use, the PopMed.</p> <p>13 Q. You say in your report that an enhanced redox state has</p> <p>14 been described with epithelial ovarian cancer.</p> <p>15 A. I'm sorry, one more time.</p> <p>16 Q. Is it your opinion that an enhanced redox state has</p> <p>17 been described in patients with epithelial ovarian</p> <p>18 cancer?</p> <p>19 A. With ovarian cancer patients, yes.</p> <p>20 Q. And enhanced redox state has been described with other</p> <p>21 types of cancer, too, correct? It's not unique to</p> <p>22 ovarian cancer?</p> <p>23 A. Okay, I don't know about other cancer, that's not my --</p> <p>24 what I do. What I do, what I talk about, what I work</p> <p>25 with is ovarian cancer. So we did work in my lab only</p>
<p style="text-align: right;">Page 279</p> <p>1 A. Okay, so we have two types of teaching in our</p> <p>2 institution they consider teaching. We have formal</p> <p>3 courses and then we have hands-on teaching, which is</p> <p>4 required for our residency program and fellowship</p> <p>5 program. I do more of the hands-on for the medical</p> <p>6 doctors for our residents and fellows in the</p> <p>7 department, then I help them write their thesis, design</p> <p>8 their experiments, do the work, so that's my primary --</p> <p>9 I spend almost significant time. I can't tell you</p> <p>10 exactly what I spend on that part, but I do.</p> <p>11 Q. Have you applied to be a full professor at Wayne State</p> <p>12 University?</p> <p>13 A. No.</p> <p>14 Q. Why not?</p> <p>15 A. Applying for a full professor at our institution</p> <p>16 requires current NIH NCI only funding, which is very</p> <p>17 hard to get these days.</p> <p>18 Q. Is it your opinion that talc induces chemoresistance?</p> <p>19 A. Talc induces chemoresistance -- so we -- I have not</p> <p>20 tested that, so this needs to be tested.</p> <p>21 Q. In connection with developing and setting out your</p> <p>22 opinions in this case, did you review all of the animal</p> <p>23 literature looking at talc and ovarian cancer?</p> <p>24 A. All of the literature, no.</p> <p>25 Q. Did you review all of the cell studies looking at talc</p>	<p style="text-align: right;">Page 281</p> <p>1 with ovarian cancer and these markers.</p> <p>2 Q. Has an enhanced redox state been described with other</p> <p>3 diseases besides cancer?</p> <p>4 A. One more time, please.</p> <p>5 MS. O'DELL: Object to form.</p> <p>6 BY MR. HEGARTY:</p> <p>7 Q. Has an enhanced redox state been described with</p> <p>8 diseases other than cancer?</p> <p>9 A. I don't know.</p> <p>10 Q. You have done research looking at that pathogenesis of</p> <p>11 tissue fibrosis, correct?</p> <p>12 A. Correct.</p> <p>13 Q. Tissue fibrosis does not increase the risk of</p> <p>14 developing cancer, correct?</p> <p>15 A. Not correct.</p> <p>16 Q. So it's your opinion that having -- that fibrosis</p> <p>17 increases the risk of cancer?</p> <p>18 A. Not correct, that's not my opinion.</p> <p>19 Q. What is your opinion with regard to the relationship</p> <p>20 between fibrosis and cancer?</p> <p>21 A. Good, I like that question. So initially when I</p> <p>22 started all this work, I was interested in tissue</p> <p>23 fibrosis and, in particular, keloids, hypertrophic</p> <p>24 scars, postoperative adhesions development, and</p> <p>25 fibroids, endometriosis, trying to answer one question</p>

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<p style="text-align: right;">Page 282</p> <p>1 in my mind, which is -- which started this whole focus</p> <p>2 of work, why, how come we have an overgrowth that is --</p> <p>3 has similar pathogenesis, yet it's not malignant, for</p> <p>4 example, fibroids, they're benign tumors, they're</p> <p>5 tumors, they're benign, what is the difference between</p> <p>6 what makes this tumor benign versus malignant? So this</p> <p>7 is my focus and my long-term interest in my life is to</p> <p>8 figure out why is this overgrowth that has oxidative</p> <p>9 stress, high this, high this, high this, but it's not</p> <p>10 malignant, fibroids, possibility of adhesions, keloids,</p> <p>11 although some keloids develop -- some fibrosis</p> <p>12 development of cancer, and endometriosis, for example.</p> <p>13 So that's the question that I'm really interested in.</p> <p>14 So that's why we look everything in comparison. I have</p> <p>15 published in here and I have published in here</p> <p>16 extensively.</p> <p>17 Q. You have published that fibrosis causes cancer?</p> <p>18 A. No, I have published that the process of fibrosis is</p> <p>19 very similar to the process of oncogenesis.</p> <p>20 Q. Does fibrosis cause cancer?</p> <p>21 MS. O'DELL: Object to form.</p> <p>22 THE WITNESS: In some cases it may.</p> <p>23 BY MR. HEGARTY:</p> <p>24 Q. Give me an example of a type of fibrosis that can cause</p> <p>25 cancer.</p>	<p style="text-align: right;">Page 284</p> <p>1 postoperative adhesions development may develop into</p> <p>2 cancer. I'm not aware of that.</p> <p>3 BY MR. KLATT:</p> <p>4 Q. You're not aware of any evidence of that, is that what</p> <p>5 you're saying?</p> <p>6 A. I'm not aware of a certain -- a specific situation</p> <p>7 where a patient developed postoperative adhesions, that</p> <p>8 postoperative adhesions causes some type of cancer</p> <p>9 somewhere.</p> <p>10 Q. I'm going to skip around just to follow up on some</p> <p>11 stuff that Mr. Hegarty brought up during the day. You</p> <p>12 mentioned your company DS Biotech this morning. What</p> <p>13 does DS stand for?</p> <p>14 A. A name I chose.</p> <p>15 Q. The D and the S don't stand for anything in particular?</p> <p>16 A. Oh, sorry, I missed the question. So D is Diamond Saed</p> <p>17 Biotech, that's my partner, used to be long time ago.</p> <p>18 Q. You had a partner named Diamond?</p> <p>19 A. Michael Diamond. When we first initiated this, we</p> <p>20 started it, but then he moved from my institution to</p> <p>21 his institution, and then I acquired the whole company.</p> <p>22 Q. So Dr. Diamond -- is it a Dr. Diamond?</p> <p>23 A. Dr. Diamond, yes.</p> <p>24 Q. He has no affiliation with DS Biotech any longer, is</p> <p>25 that true?</p>
<p style="text-align: right;">Page 283</p> <p>1 A. Keloids, fibroblastoma can develop, endometriosis can</p> <p>2 induce maybe ovarian cancer, there's a link between the</p> <p>3 two.</p> <p>4 Q. Do postoperative adhesions cause cancer?</p> <p>5 A. We don't know.</p> <p>6 Q. Doctor, I'm going to rest for a moment and let my</p> <p>7 colleague representing Imerys ask you some questions as</p> <p>8 well.</p> <p>9 EXAMINATION BY MR. KLATT:</p> <p>10 Q. Hello, Dr. Saed. My name is Mike Klatt and I represent</p> <p>11 Imerys Talc America in this case. Have you ever heard</p> <p>12 of Imerys Talc America before today?</p> <p>13 A. Heard on the news, yes.</p> <p>14 Q. I'm sorry?</p> <p>15 A. Heard about it, yes.</p> <p>16 Q. What do you know about Imerys?</p> <p>17 A. I know that very small thing, mining company.</p> <p>18 Q. How did you learn that?</p> <p>19 A. From the news.</p> <p>20 Q. You said just a minute ago that we don't know whether</p> <p>21 postoperative intra-abdominal adhesions cause cancer;</p> <p>22 is that true?</p> <p>23 A. I am not aware --</p> <p>24 MS. O'DELL: Object to the form.</p> <p>25 THE WITNESS: -- that incidence of</p>	<p style="text-align: right;">Page 285</p> <p>1 A. No, for the last even seven, eight years.</p> <p>2 Q. When's the last time you had an NIH NCI grant?</p> <p>3 A. It should be in my CV, really bad memory, although I</p> <p>4 should remember such a great thing. You want me to</p> <p>5 look for it?</p> <p>6 Q. How long's it going to take you?</p> <p>7 A. I don't know, I have to look in my list of grants --</p> <p>8 when was it, when was it -- do you want me to</p> <p>9 approximate?</p> <p>10 Q. Sure.</p> <p>11 A. NIH -- I think it's 2005 -- pending, submitted --</p> <p>12 previously funded, okay, here we go. So I was part of</p> <p>13 the -- I was co-principal investigator in the Wayne</p> <p>14 State University partnership to promote diversity for</p> <p>15 reproductive sciences, that was 3,020,000 something. I</p> <p>16 was a co-investigator with Dr. Michael Diamond as a</p> <p>17 principal investigator to this Wayne State Clinical</p> <p>18 Translational Science Award.</p> <p>19 Q. What year is the question?</p> <p>20 A. So there are many, 2015, 2012, 2012, 2012, this was the</p> <p>21 major one where I was the principal investigator</p> <p>22 looking for adhesions and the role of hypoxia, and that</p> <p>23 was 2012.</p> <p>24 Q. What level NIH grant was that?</p> <p>25 A. That's an RO1.</p>

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<p style="text-align: right;">Page 286</p> <p>1 Q. Can ovulation cause the DNA damage that results in 2 ovarian cancer? 3 A. You are asking my opinion? 4 Q. Yes. 5 A. Or my -- based on science? 6 Q. Well, I hope your opinion's based on science, but what 7 is your opinion? 8 A. Okay. So ovulation theory has been there for a long 9 time, and I don't know if there is a link between 10 ovulation and damage to DNA particular to that. 11 Q. Is ovulation an inflammatory event? 12 A. It is. 13 Q. And in a woman that has a normal reproductive life, 14 that can occur 2, 400 times in her lifetime, correct? 15 A. I am not a reproductive scientist. 16 Q. You don't know? 17 A. I don't know. 18 Q. Woman that has a 40-year reproductive life times 12? 19 A. I do know that. 20 Q. That's 480 ovulatory cycles, correct? 21 A. If you say so, I don't know. 22 Q. You don't know about this? 23 A. I do know -- 24 MS. O'DELL: Object to the form. 25 THE WITNESS: Excuse me, okay, I am not --</p>	<p style="text-align: right;">Page 288</p> <p>1 A. Not correct. 2 Q. You don't know that? 3 MS. O'DELL: Object to the form. 4 THE WITNESS: It's a theory; I just answered 5 you. 6 BY MR. KLATT: 7 Q. Are you aware of the data that lifetime ovulations is 8 directly related to ovarian cancer risk? 9 MS. O'DELL: Object to the form. 10 THE WITNESS: So do you mean that there are 11 data out there that is showing a direct link to normal 12 ovulation process and the development -- increased risk 13 of getting ovarian cancer? 14 BY MR. KLATT: 15 Q. Thank you. 16 MR. LAPINSKI: Doctor, was that an answer or 17 a question? 18 THE WITNESS: That was a question to you. 19 BY MR. KLATT: 20 Q. Well, I'm asking the questions, you're giving me the 21 answers. Are you aware of data that increased number 22 of lifetime ovulations increases ovarian cancer risk? 23 MS. O'DELL: Object to the form. 24 THE WITNESS: And then I answered you, I 25 answered you, if you mean that you're looking for</p>
<p style="text-align: right;">Page 287</p> <p>1 again, I am not a reproductive scientist, so I know as 2 much as anybody know, like ovulation, yes, I do know 3 about it, I know about the ovulation theory, I know 4 that ovulation is cause of inflammation, I do know all 5 that. 6 BY MR. HEGARTY: 7 Q. And is it your opinion, as a scientist who studied in 8 the field you studied, that ovulation can cause ovarian 9 cancer? 10 A. I don't know, it needs to be tested. 11 Q. Even though it's an inflammatory event that occurs 12 every month, correct? 13 A. Maybe that's a natural inflammatory response. 14 Q. But you don't know, one way or the other, correct? 15 A. Yeah, there's a big difference between a naturally- 16 induced inflammatory response versus an external 17 exogenous induced inflammation. 18 Q. Certainly you're aware it's the opinion of many in the 19 field that incessant ovulation does cause ovarian 20 cancer, correct. 21 A. That was just a theory. 22 Q. I'm sorry? 23 A. A theory. 24 Q. And certainly ovarian cancer risk is directly related 25 to number of lifetime ovulations, correct?</p>	<p style="text-align: right;">Page 289</p> <p>1 specific data that linking normal ovulation to 2 inflammation that causes or increases the risk of 3 ovarian cancer, is that what you mean? 4 BY MR. KLATT: 5 Q. I'm simply asking you if you're aware of data that 6 number of lifetime or of ovulations correlates with 7 increased ovarian cancer risk; that's all I'm asking. 8 A. My answer again, I'm aware that this is a theory, and I 9 don't know if it's based on data. 10 Q. Is the mechanism that causes post-surgical adhesions 11 the same mechanism that you think can result in ovarian 12 cancer? 13 A. No, they have similarities but not the same. 14 Q. Can oxidative stress be induced by low vitamin E? 15 A. I don't know. 16 Q. Can oxidative stress be induced by low vitamin C? 17 A. I don't know. 18 Q. Can oxidative stress be induced by low uric acid? 19 A. We never tested that. 20 Q. Can oxidative stress be induced by albumin levels? 21 A. We never tested that. 22 Q. You said you'd never given a deposition before, 23 correct? 24 A. Correct. 25 Q. And you've also never testified in a court before, is</p>

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<p>1 that right?</p> <p>2 A. Correct.</p> <p>3 Q. Early this morning you said that high, very high doses</p> <p>4 of talc were toxic to cells. What did you mean by</p> <p>5 that?</p> <p>6 A. We tried 1,000 micrograms per ml, 1,000 micrograms per</p> <p>7 ml, induced toxicity, so decreased viability, yes.</p> <p>8 Q. How are you defining toxicity at this time?</p> <p>9 A. Decreases cell viability.</p> <p>10 Q. Does that mean decrease in cell number?</p> <p>11 A. No, I said cell viability.</p> <p>12 Q. What does that mean?</p> <p>13 A. Death.</p> <p>14 Q. Okay.</p> <p>15 A. Okay.</p> <p>16 Q. Do you agree with me that CA-125 levels can be</p> <p>17 increased or elevated by pregnancy?</p> <p>18 A. I don't know this information.</p> <p>19 Q. Can CA-125 levels be increased during the menstrual</p> <p>20 period?</p> <p>21 A. I am not an OB-GYN oncologist, I am not an expert in</p> <p>22 this. I defer this to a clinician.</p> <p>23 Q. Can CA-125 levels be increased by women who have</p> <p>24 uterine fibroids?</p> <p>25 A. Again, I gave you my answer.</p>	<p>1 Q. And in the lower right-hand corner there's two page</p> <p>2 numbers. One's a stamped page number that we call a</p> <p>3 Bates Number, and the other is a handwritten page</p> <p>4 number, correct?</p> <p>5 A. This and this? Yes.</p> <p>6 MS. O'DELL: Yes.</p> <p>7 BY MR. KLATT:</p> <p>8 Q. When were those handwritten page numbers added to the</p> <p>9 lab book?</p> <p>10 A. I don't know.</p> <p>11 Q. Because we had gotten a black and white copy of the lab</p> <p>12 book, and there were no page numbers on it, so were</p> <p>13 they added recently?</p> <p>14 A. No, definitely not. They should have them, you should</p> <p>15 have them in your black, white and black.</p> <p>16 Q. Would you look at Exhibit 1 handwritten Page 31 Bates</p> <p>17 Number, and I'll just say the last two Bates Numbers</p> <p>18 02.</p> <p>19 A. Page 2, you said?</p> <p>20 Q. Yes, Page 02 is the stamp number and Page 31 --</p> <p>21 A. Yes.</p> <p>22 Q. -- is the handwritten number.</p> <p>23 A. I'm looking at it.</p> <p>24 Q. Down at the bottom it says cells doubled in one day.</p> <p>25 What's that referring to?</p>
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<p>1 Q. Can CA-125 be increased by coronary heart disease?</p> <p>2 A. I don't know.</p> <p>3 Q. Can you look at Exhibit Number 1, please, which I</p> <p>4 believe is the copy of your lab book.</p> <p>5 A. Lab report, okay.</p> <p>6 Q. And I'm going to -- does your copy have the Bates</p> <p>7 Numbers down on the right-hand corner?</p> <p>8 MS. O'DELL: He's looking at the actual lab</p> <p>9 notebook.</p> <p>10 MR. KLATT: Is it Bates Numbered?</p> <p>11 MS. O'DELL: Not the lab notebook, no. We</p> <p>12 have not made markings on this.</p> <p>13 MR. KLATT: Do you have a copy of Exhibit 1?</p> <p>14 Let's make sure we're referring --</p> <p>15 MS. O'DELL: I think that may be yours, and,</p> <p>16 Mike, if you wouldn't mind directing us to the page</p> <p>17 number that's written on the actual book itself.</p> <p>18 MR. KLATT: Yeah, I'll give both the Bates</p> <p>19 number and the page number.</p> <p>20 MS. O'DELL: That would be good.</p> <p>21 BY MR. KLATT:</p> <p>22 Q. Are you looking now at Exhibit 1, Doctor?</p> <p>23 A. Yes.</p> <p>24 Q. And it's a copy of the lab notebook, correct?</p> <p>25 A. Yes.</p>	<p>1 A. Okay, so when you culture the cells, you want to get --</p> <p>2 cells divide and they double, so you want to have them</p> <p>3 in the stage -- that's just a notation that the cell</p> <p>4 doubled so we can start the experiment.</p> <p>5 Q. And so were these cells doubling each day?</p> <p>6 A. No, no, not necessarily. This is just to follow up the</p> <p>7 progress of cell growth. And then we take from that 1</p> <p>8 million cells, and then we start, because the space for</p> <p>9 the cell is very important, so if they don't double in</p> <p>10 one day, it means that the space is not good and they</p> <p>11 are overcrowded, so now we split them. So this is an</p> <p>12 indication that they're ready for us so we can use.</p> <p>13 Q. Did you try to measure cell proliferation in the</p> <p>14 presence of talc by BRDU incorporation?</p> <p>15 A. What is PRDU?</p> <p>16 Q. BRDU incorporation, are you familiar with that method?</p> <p>17 A. BRDU? I've never heard of that.</p> <p>18 Q. What about Ki-67, did you use that method --</p> <p>19 A. No.</p> <p>20 Q. -- in your experiments to measure cell proliferation?</p> <p>21 A. As I stated earlier, Ki-67 is used by pathologists</p> <p>22 mainly or researchers in tissue sections.</p> <p>23 Q. My question is did you use it in this --</p> <p>24 A. No.</p> <p>25 Q. -- experiment? Did you try to count cells to measure</p>

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<p style="text-align: right;">Page 294</p> <p>1 proliferation using a hemocytometer?</p> <p>2 A. Okay, for cell proliferation we use MTT assay, that's</p> <p>3 even more accurate than what you're referring to, but</p> <p>4 we always count cells with hemocytometer to start with</p> <p>5 1 million cells, this is how we start.</p> <p>6 Q. But did you try to measure cell proliferation in your</p> <p>7 experiments by using a hemocytometer in cell counting?</p> <p>8 A. Cell proliferation cannot be measured by cell count.</p> <p>9 Q. Would you agree with me that MTT is not the optimal</p> <p>10 method to measure cell proliferation?</p> <p>11 A. It is one of the best methods we have tested.</p> <p>12 Q. It simply measures cell metabolism, doesn't it?</p> <p>13 A. It measures the -- it differentiates between cells,</p> <p>14 cells that incorporate the dye versus cells that it</p> <p>15 doesn't incorporate the dye, which means it</p> <p>16 differentiates between viable cells and proliferative</p> <p>17 cells.</p> <p>18 Q. And if you increase the metabolism of a certain number</p> <p>19 of cells, that will increase the dye level even if you</p> <p>20 don't have a greater number of cells?</p> <p>21 A. I don't know about metabolism that you're throwing in</p> <p>22 here.</p> <p>23 Q. You don't know about that?</p> <p>24 A. No.</p> <p>25 Q. Can you look again, referring to Exhibit 1, and I'm</p>	<p style="text-align: right;">Page 296</p> <p>1 A. Oh, that's a different question. I thought you were</p> <p>2 talking about the sample ID refers to what. That's my</p> <p>3 answer.</p> <p>4 Q. I'm talking about in your experiment.</p> <p>5 A. In my experiment, we took like, for example, normal</p> <p>6 macrophages from one plate, and we divided that into</p> <p>7 two. One plate got treatment, the other plate no</p> <p>8 treatment. And then we continue, we isolated RNA.</p> <p>9 Q. So for, for example, let's take Sample ID 357, EL1 5</p> <p>10 micrograms of talc?</p> <p>11 A. Yes.</p> <p>12 Q. That was on one plate?</p> <p>13 A. Okay, let me explain this one more time. So you</p> <p>14 take -- this is the stock samples, we call it 356,</p> <p>15 okay. We split that into -- we take -- we can --</p> <p>16 that's why when you said one plate, it's not true,</p> <p>17 because we take one, two, three, four plates, okay, so</p> <p>18 each plate will get the treatment like 5 micrograms, 20</p> <p>19 micrograms, 100 micrograms.</p> <p>20 Q. I understand that. I'm just talking about Sample 357?</p> <p>21 A. 357 is 1 million cells of macrophages treated with 5</p> <p>22 microgram per ml of talc.</p> <p>23 Q. And it was one plate?</p> <p>24 A. 1 million cells, one plate.</p> <p>25 Q. And then from that you took mRNA, correct?</p>
<p style="text-align: right;">Page 295</p> <p>1 referring to the Bates Stamped page that ends in -- the</p> <p>2 stamp number is 03 and the handwritten Page 32.</p> <p>3 A. Yes.</p> <p>4 Q. And there's a list there of sample IDs, is that</p> <p>5 correct?</p> <p>6 A. Correct.</p> <p>7 Q. And are those the cell lines that you tested in your</p> <p>8 experiments?</p> <p>9 A. Yes, in this experiment.</p> <p>10 Q. And I want to make sure I understand, for each sample</p> <p>11 ID, let's just take the first one Sample ID 356, the</p> <p>12 EL1 untreated, so would that sample represent one plate</p> <p>13 of those cells?</p> <p>14 A. The 356?</p> <p>15 Q. Right?</p> <p>16 A. It represents an aliquot of normal macrophages with no</p> <p>17 treatment with talc.</p> <p>18 Q. And is it one plate of cells?</p> <p>19 A. It could be one if we need or two or three or four,</p> <p>20 depends on --</p> <p>21 Q. What was it in this case?</p> <p>22 A. Any sample that carry this number is a normal</p> <p>23 macrophages, you can have it in one plate, two plates,</p> <p>24 five plates, 10 plates.</p> <p>25 Q. And what did you have it in your experiment?</p>	<p style="text-align: right;">Page 297</p> <p>1 A. Correct.</p> <p>2 Q. And then from the mRNA from that one plate of cells,</p> <p>3 you took -- or created CDNA, correct?</p> <p>4 A. Correct.</p> <p>5 Q. And then at the end of the day, you measured that CDNA</p> <p>6 three separate times, correct?</p> <p>7 A. Correct.</p> <p>8 Q. And from the process I just described, that all</p> <p>9 originated for 357 from that one plate that was treated</p> <p>10 with 5 micrograms of talc, correct?</p> <p>11 A. One plate, yes.</p> <p>12 Q. And did you do that for each of the cell lines listed</p> <p>13 Samples 356 through 386?</p> <p>14 A. Yes, let me explain something here. So we --</p> <p>15 Q. That's all I needed.</p> <p>16 A. Okay. Can I explain something?</p> <p>17 Q. Sure.</p> <p>18 A. So I know what you're referring to that this is called</p> <p>19 N = 1, but we have even better and more precise way of</p> <p>20 measuring this very old method of doing it. We chose</p> <p>21 to do instead of repeat the same one three times, so</p> <p>22 N = 3, we actually chose three different normal cells</p> <p>23 and three different ovarian cancer cells, and that is</p> <p>24 more powerful than using the same one three times.</p> <p>25 Q. Okay.</p>

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<p style="text-align: right;">Page 298</p> <p>1 MR. LOCKE: Can I just make an objection. 2 Those are the kind of answers that your counsel can ask 3 you the question so you can give an explanation. All 4 of the defendants don't have time to question you, so 5 "yes" or "no" would be helpful, particularly at this 6 point where we're really running out of time. 7 MS. O'DELL: Well, he's been asking specific 8 questions about plates, and for it not to be clear, and 9 he needs to -- he needs to give a responsive answer. 10 MR. LOCKE: We're wasting time. 11 BY MR. KLATT: 12 Q. What I want to know is for 357 and all the sample IDs 13 listed here, there was one individual plate for each 14 sample ID treated with a certain level of talc, 15 correct? 16 A. Correct. 17 Q. Easy, Doctor. 18 A. Thank you. 19 Q. Gene expression, measuring gene expression is not the 20 same thing as measuring gene mutations, correct? 21 A. Gene expression refers to mRNA levels that is reflected 22 in protein levels. 23 Q. Gene expression is something that occurs all the time 24 in our bodies every day, correct? 25 A. Correct.</p>	<p style="text-align: right;">Page 300</p> <p>1 Q. The major source of ROS comes from inside the cells 2 from mitochondria, correct? 3 A. Not accurate answer, no. 4 Q. Can you distinguish between ROS produced inside the 5 mitochondria of the cell from ROS produced outside the 6 cell? 7 A. There are some enzymes that are produced from the 8 mitochondria like SOD in different forms, and there are 9 SODs that are produced from the membrane of the cell 10 and the cytoplasm, so it depends. 11 Q. Do you agree that the persistent generation of cellular 12 ROS is a consequence of aging? 13 A. I didn't study aging. 14 Q. You haven't said that before? 15 A. That -- 16 Q. The persistent generation of cellular ROS is a 17 consequence of aging. 18 A. I don't remember. Aging of the cells or aging of 19 people? 20 Q. Aging of people. 21 A. I don't remember I said that. 22 Q. You didn't sequence the DNA in your studies to 23 determine mutations, correct? You only used the SNP 24 gene assay? 25 A. I used the SNP gene assay, yes.</p>
<p style="text-align: right;">Page 299</p> <p>1 Q. It's how we live as people, right? 2 A. Yes. 3 Q. If we didn't have gene expression, we'd be dead? 4 A. I don't know why you're saying that. 5 Q. Is it true? 6 A. Of course. 7 Q. You would agree with me that a reactive oxygen species, 8 and can we call that ROS for short, Doctor? 9 A. Yes, I'm thinking, reactive oxygen and reactive 10 nitrogen species, let's call them oxidants. 11 Q. I'm sorry? 12 A. Oxidants. 13 Q. Oxidants? Well, what if I'm specifically asking about 14 ROS, reactive oxygen -- 15 A. You can, it depends on which one you would specify I 16 would answer, yes. 17 Q. Okay. So if I say ROS, can we agree I'm talking about 18 reactive oxygen species? 19 A. Yes. Which one, though? You have to tell me. 20 Q. As a category. 21 A. Okay, keep going. 22 Q. ROS aren't the same thing as inflammation, correct? 23 A. Not correct. 24 Q. ROS are a part of normal cell physiology, correct? 25 A. Normal levels of ROS found in cells, yes.</p>	<p style="text-align: right;">Page 301</p> <p>1 Q. You realize the same company that made the SNP gene 2 assay that you used also makes a gene mutation assay? 3 A. No, I'm not aware of that. 4 Q. You're not aware of that? 5 A. No. 6 Q. But so, therefore, you did not use that company's gene 7 mutation assay in your experiments, correct? 8 MS. O'DELL: Object to the form. 9 THE WITNESS: I used the core facility at our 10 institutions, and this is what they ran and this is 11 what I have. 12 BY MR. KLATT: 13 Q. So you did not use the gene mutation assay made by the 14 same company that makes the SNP assay that you used in 15 your studies, correct? 16 MS. O'DELL: Object to the form. 17 THE WITNESS: The core facility ordered the 18 kits, and they are the one who choose which company to 19 buy it from. I have no influence in that. 20 BY MR. KLATT: 21 Q. So was the core facility the one that decided to use 22 the SNP assay rather than the gene mutation assay or 23 was that your decision? 24 A. That was what is available in the core facility, and I 25 said I want to use it.</p>

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<p>1 Q. But you were unaware that the same company that makes</p> <p>2 the SNP assay also makes a gene mutation assay; is that</p> <p>3 true?</p> <p>4 MS. O'DELL: Object to the form.</p> <p>5 THE WITNESS: I don't even know what company</p> <p>6 you're talking about.</p> <p>7 BY MR. KLATT:</p> <p>8 Q. Do you know what company made the SNP assay?</p> <p>9 A. The core facility ordered the SNP kit, they just give</p> <p>10 you -- I'm interested in doing the SNP mutation and</p> <p>11 this is what we run, so please run these samples for</p> <p>12 me.</p> <p>13 Q. Did you ask them not to use a gene mutation assay?</p> <p>14 A. Not to use? I didn't ask them, no.</p> <p>15 Q. Would you agree with me that the determination of the</p> <p>16 redox state of a cell is determined by far more enzymes</p> <p>17 and proteins and substances than just the ones you</p> <p>18 looked at in your talc studies?</p> <p>19 MS. O'DELL: Object to the form.</p> <p>20 THE WITNESS: We -- in my studies we looked</p> <p>21 at there are many enzymes, but we're looking at key</p> <p>22 enzymes that control the redox balance.</p> <p>23 BY MR. KLATT:</p> <p>24 Q. Object, nonresponsive. Do you agree with me that redox</p> <p>25 balance in cells is controlled by far more enzymes,</p>	<p>1 A. Saying it, I don't recall saying it.</p> <p>2 Q. Do you recall writing it?</p> <p>3 A. Maybe, but that does not agree with what you just said,</p> <p>4 what you read.</p> <p>5 Q. Can oxidative stress both promote apoptosis and promote</p> <p>6 cell survival?</p> <p>7 A. Oxidative stress is a balance, so it's not just simple</p> <p>8 process. So the outcome of this balance promote</p> <p>9 proliferation, promote survival, and decrease</p> <p>10 apoptosis.</p> <p>11 Q. Can oxidative stress be both pro-tumorigenic and</p> <p>12 anti-tumorigenic?</p> <p>13 A. You mean marker, some certain markers of oxidative</p> <p>14 stress? Is that what you're referring to?</p> <p>15 Q. Sure.</p> <p>16 A. Certain markers of oxidative stress can have -- can</p> <p>17 induce tumors and can inhibit tumor, I'm not really</p> <p>18 aware of that.</p> <p>19 Q. Are you aware of any study case report or case series</p> <p>20 that says that women that use talc in the external</p> <p>21 genital area have increased fibrosis or adhesions</p> <p>22 anywhere in their reproductive tract?</p> <p>23 MS. O'DELL: Object to the form.</p> <p>24 THE WITNESS: Have I -- am I aware of people</p> <p>25 use talcum powder is linked to development of</p>
Page 303	Page 305
<p>1 proteins, and substances than you looked at in your</p> <p>2 talc studies?</p> <p>3 MS. O'DELL: Object to the form.</p> <p>4 THE WITNESS: And I answered. I said</p> <p>5 these -- the one we looked at are the main, there are</p> <p>6 others, but they're not major players. Those are, the</p> <p>7 one we studied are the major contributor to the overall</p> <p>8 pro-oxidant state of the cell.</p> <p>9 BY MR. KLATT:</p> <p>10 Q. And some of those enzymes in some cancers are pro-</p> <p>11 tumorigenic and some of those same enzymes in other</p> <p>12 cancers are anti-tumorigenic, correct?</p> <p>13 A. I'm not aware of that.</p> <p>14 Q. You haven't said that before?</p> <p>15 A. Said that exact word? No.</p> <p>16 Q. Do you recall ever saying this: Decreasing oxidative</p> <p>17 stress and increased SOD promotes apoptosis in the</p> <p>18 cancer cell lines studied, but multiple other studies</p> <p>19 performed using other cell lines have shown the</p> <p>20 opposite, that decreased SOD can promote apoptosis?</p> <p>21 MS. O'DELL: Object to the form.</p> <p>22 THE WITNESS: So this -- I said that? Or you</p> <p>23 took this from my --</p> <p>24 BY MR. KLATT:</p> <p>25 Q. I'm asking if you recall saying that?</p>	<p>1 possibility of adhesions?</p> <p>2 BY MR. KLATT:</p> <p>3 Q. I'm asking you a very specific question. Are you aware</p> <p>4 of any articles in the medical or scientific</p> <p>5 literature, any case studies, any case reports of women</p> <p>6 who used external talc having increased adhesions,</p> <p>7 fibrosis, granulomas anywhere in their reproductive</p> <p>8 tract?</p> <p>9 MS. O'DELL: Object to the form.</p> <p>10 THE WITNESS: What do you mean by external?</p> <p>11 BY MR. KLATT:</p> <p>12 Q. What does external mean to you?</p> <p>13 A. I'm asking you.</p> <p>14 Q. I'm asking the questions, Doctor.</p> <p>15 A. Okay, I understand, I just want to clarify.</p> <p>16 Q. Do you understand what external talc application means?</p> <p>17 MS. O'DELL: You didn't say that, you just</p> <p>18 said external, so, anyway.</p> <p>19 If you understand his question, answer the</p> <p>20 question or define what you mean.</p> <p>21 BY MR. KLATT:</p> <p>22 Q. Let me ask the question again. Are you aware of any</p> <p>23 study in the medical or scientific literature, case</p> <p>24 report, that shows that external genital application of</p> <p>25 talc results in increased fibrosis, granulomas, or</p>

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<p style="text-align: right;">Page 306</p> <p>1 adhesions anywhere inside the female reproductive</p> <p>2 tract?</p> <p>3 MS. O'DELL: Object to the form.</p> <p>4 THE WITNESS: I'm not aware.</p> <p>5 BY MR. KLATT:</p> <p>6 Q. Are you aware that according to studies, anywhere from</p> <p>7 30 to 50 percent of U.S. women have used talc in the</p> <p>8 external genital area?</p> <p>9 A. I'm sorry, say that again, sorry.</p> <p>10 Q. Are you aware from studies that anywhere from 30 to 50</p> <p>11 percent of U.S. women have used talcum powder in the</p> <p>12 external genital area?</p> <p>13 A. I'm not sure about the number.</p> <p>14 Q. Are you aware of any epidemic of granulomas, fibrosis,</p> <p>15 or adhesions in women who use externally applied</p> <p>16 genital talc?</p> <p>17 MS. O'DELL: Object to the form.</p> <p>18 THE WITNESS: I don't know if -- I don't know</p> <p>19 if any relation between talc powder use and adhesions.</p> <p>20 BY MR. KLATT:</p> <p>21 Q. Is there a way to measure the redox state directly</p> <p>22 inside of cells?</p> <p>23 A. Very difficult.</p> <p>24 Q. Can it be done?</p> <p>25 A. The data will not be very reliable.</p>	<p style="text-align: right;">Page 308</p> <p>1 look and see if I have any other notes.</p> <p>2 THE VIDEOGRAPHER: Going off the record at</p> <p>3 6:18 p.m.</p> <p>4 (An off-the-record discussion was held.)</p> <p>5 THE VIDEOGRAPHER: Back on the record at 6:19</p> <p>6 p.m.</p> <p>7 BY MR. KLATT:</p> <p>8 Q. Doctor, in your PCR studies, did you normalize for</p> <p>9 actin?</p> <p>10 A. Yes.</p> <p>11 Q. And how did you do that?</p> <p>12 A. So we did PCR for beta-actin.</p> <p>13 Q. And where is that indicated in your lab --</p> <p>14 A. It is page -- every experiment we did with PCR we ran</p> <p>15 beta-actin, and if you go to Page -- what's this page</p> <p>16 here --</p> <p>17 MS. O'DELL: What's the ending Bates Number</p> <p>18 on there?</p> <p>19 BY MR. KLATT:</p> <p>20 Q. There may be a Bates Number in the lower right hand</p> <p>21 corner.</p> <p>22 A. 10.</p> <p>23 Q. Okay. I'm with you.</p> <p>24 A. Are you there?</p> <p>25 Q. Yes.</p>
<p style="text-align: right;">Page 307</p> <p>1 Q. Is there a method to do that?</p> <p>2 A. You can measure H2O2, you can measure nitrosylation,</p> <p>3 degree of nitrosylation of protein, we have done that</p> <p>4 with Caspase-3 and S-nitrosylation of Caspase-3 as a</p> <p>5 measure of how the level of antioxidants. The accurate</p> <p>6 way to measure it is to measure the key players</p> <p>7 together to have the complete picture.</p> <p>8 Q. Those two methods that you just named, did you use</p> <p>9 those in any of your talc studies?</p> <p>10 A. What methods?</p> <p>11 Q. The methods you just listed for me which were a way to</p> <p>12 directly measure the redox state of cells.</p> <p>13 A. Measuring all markers? Oh, the other method, yes, they</p> <p>14 are listed here.</p> <p>15 Q. Did you use those?</p> <p>16 A. I'm sorry, I'm missing you. Am I use ever in my lab or</p> <p>17 in this study?</p> <p>18 Q. In the talc studies.</p> <p>19 A. The S-nitrosylation of Caspase-3, we did not use in</p> <p>20 this study.</p> <p>21 Q. And there was one other method that you mentioned.</p> <p>22 A. The H2O2.</p> <p>23 Q. Did you use that method in your talc --</p> <p>24 A. No, we used it for catalase activity indirectly.</p> <p>25 Q. Can we go off the record for a second. I just need to</p>	<p style="text-align: right;">Page 309</p> <p>1 A. It's even cut off from here, I don't know why. But you</p> <p>2 see the standard curve?</p> <p>3 Q. Yes.</p> <p>4 A. Okay, so what we do here, we do a realtime RT-PCR where</p> <p>5 we design a small oligo that is flanked by the primers,</p> <p>6 and we order that to be synthesized, and we know the</p> <p>7 concentration, we dilute it down, and we create a</p> <p>8 standard curve, and we use this standard curve to</p> <p>9 extrapolate the results and normalize for our level of</p> <p>10 mRNA with the treatment.</p> <p>11 Q. Can I ask you a question. On Page 10, that indicates</p> <p>12 raw data, correct?</p> <p>13 A. Page 10?</p> <p>14 Q. The page you were just looking at.</p> <p>15 A. I just want to see, it's not clear here. I just want</p> <p>16 to see what page is this here. I'm with you.</p> <p>17 MS. O'DELL: What's the question, Mike?</p> <p>18 BY MR. KLATT:</p> <p>19 Q. Looking at Page 10 on Exhibit 1, and I'm not talking</p> <p>20 about the lab page number, I'm talking about the Bates</p> <p>21 Number, if you look for Sample 356, you see to the</p> <p>22 right there's numbers 285995.18, 273439.209?</p> <p>23 A. Uh-huh.</p> <p>24 Q. And 409589.891?</p> <p>25 A. Correct.</p>

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<p>1 Q. If you turn to the next page, those numbers are</p> <p>2 replicated for Sample 356.</p> <p>3 A. What next page?</p> <p>4 Q. The very next page in the --</p> <p>5 A. Here?</p> <p>6 Q. Yeah.</p> <p>7 A. Okay. Where are they? 356, this is copies per</p> <p>8 micrograms of CDNA.</p> <p>9 Q. And that corresponds to those numbers, those same three</p> <p>10 numbers on the previous page, correct?</p> <p>11 A. So this is the copy number, 28274095, yeah, I see</p> <p>12 they're the same.</p> <p>13 Q. But for the 357 sample, the numbers don't correspond</p> <p>14 between those two pages, correct?</p> <p>15 A. Correct.</p> <p>16 Q. And can you explain why?</p> <p>17 A. So that's why we normalize, because you will have</p> <p>18 different copy numbers all the time, so we normalize</p> <p>19 it.</p> <p>20 Q. Can you go to the next page, which would be notebook</p> <p>21 page -- handwritten Page 39 and Bates Number 11.</p> <p>22 A. 39? I'm still on the same page, right?</p> <p>23 MS. O'DELL: That's where we were I thought,</p> <p>24 unless I was confused about your question.</p> <p>25 BY MR. KLATT:</p>	<p>1 A. Yeah. Is it Page 41?</p> <p>2 MS. O'DELL: You're on Page 11?</p> <p>3 MR. KLATT: Correct.</p> <p>4 MS. O'DELL: So I think it's this page.</p> <p>5 THE WITNESS: Oh. Isn't it this page?</p> <p>6 MS. O'DELL: No, I think it's back, if I'm</p> <p>7 not mistaken.</p> <p>8 THE WITNESS: Oh, here. We were on this</p> <p>9 page, right?</p> <p>10 BY MR. KLATT:</p> <p>11 Q. I'm confused because you're looking at the real lab</p> <p>12 notebook and I'm looking at --</p> <p>13 A. No, no, no, we were on the same page. I thought you</p> <p>14 asked me to go to a different page. I see that column.</p> <p>15 Q. Just so we're on the same wavelength --</p> <p>16 A. I see it.</p> <p>17 Q. -- I'm referring to Page 11 Bates Number, correct?</p> <p>18 A. Picogram per microgram for RNA.</p> <p>19 Q. Right.</p> <p>20 A. 4.58, the first number.</p> <p>21 Q. 4.58?</p> <p>22 A. Uh-huh.</p> <p>23 Q. Right, and if you go -- that whole column's full of</p> <p>24 numbers, correct?</p> <p>25 A. This column, yes.</p>
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<p>1 Q. Well, Bates Number -- my Bates Number's cut off, excuse</p> <p>2 me, my handwritten number's cut off so I'm going to the</p> <p>3 Bates Number, which is 11.</p> <p>4 MS. O'DELL: Okay, it's Page --</p> <p>5 THE WITNESS: The next page.</p> <p>6 BY MR. KLATT:</p> <p>7 Q. Okay. And do you see the column toward the right</p> <p>8 called picograms per microgram of RNA?</p> <p>9 A. Where is that?</p> <p>10 Q. The third column from the right-hand side.</p> <p>11 A. On Page -- in this page, right?</p> <p>12 Q. Page 11, Bates Stamped Page 11.</p> <p>13 A. This is the page, okay, this is the page. So you're</p> <p>14 looking at microgram?</p> <p>15 Q. Picograms per microgram per RNA, do you see that</p> <p>16 column?</p> <p>17 A. I see copies per microgram for RNA, I see copies per</p> <p>18 microgram for RNA, thintogram (sic) per microgram for</p> <p>19 RNA. Is what you're looking at?</p> <p>20 Q. I'm looking right here, picograms per micrograms RNA</p> <p>21 the third column from the right.</p> <p>22 A. 1, 2, 3, that's called thintogram (sic).</p> <p>23 Q. And what's the first number in that column?</p> <p>24 A. 125. Is that what you're looking at?</p> <p>25 Q. I think we're not looking in the same place.</p>	<p>1 Q. And then to the right of that you have an average,</p> <p>2 correct?</p> <p>3 A. Yes.</p> <p>4 Q. Sometimes you average two of the three numbers,</p> <p>5 sometimes you average all three numbers.</p> <p>6 A. Correct.</p> <p>7 Q. Why do you only average two of the three numbers</p> <p>8 sometimes?</p> <p>9 A. If we have outlier, really high, different.</p> <p>10 Q. And what's your criteria for throwing out an outlier?</p> <p>11 A. So if you have 4.5, 4.3, and 6.5, that's an outlier.</p> <p>12 Q. What's your threshold for classifying something as an</p> <p>13 outlier to not include it in your calculations?</p> <p>14 A. So if the two numbers match, the closer they match and</p> <p>15 the higher the outlier is is what we determine.</p> <p>16 Q. So do you always throw out the outlier of the three</p> <p>17 values?</p> <p>18 A. Not always, not necessarily.</p> <p>19 Q. So I'm just trying to figure what's your criteria</p> <p>20 for --</p> <p>21 A. So if they are like, for example, close like, for</p> <p>22 example, here, if we don't know that it is an outlier,</p> <p>23 like, for example, here, 3.6, 4.3, 3.2, it's very hard</p> <p>24 to determine an outlier, but if you have 6 and 6 and 7,</p> <p>25 it is not hard.</p>

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<p>1 Q. Do you have a certain numerical criteria that you use</p> <p>2 to classify something as an outlier that you're going</p> <p>3 to exclude from your calculations?</p> <p>4 A. I just told you.</p> <p>5 Q. What's the numerical value?</p> <p>6 A. I don't have a numerical value.</p> <p>7 Q. You just eyeball it?</p> <p>8 MS. O'DELL: Object to the form.</p> <p>9 THE WITNESS: No, no, no, no, please, so I</p> <p>10 just said that if the two numbers, okay, agrees very</p> <p>11 close, the closer the two numbers together and the more</p> <p>12 further is the other number, that is considered an</p> <p>13 outlier to me.</p> <p>14 BY MR. KLATT:</p> <p>15 Q. But, again, you don't have any numerical formula that</p> <p>16 you follow to make that determination, correct?</p> <p>17 MS. O'DELL: Object to the form.</p> <p>18 THE WITNESS: I told you what I follow.</p> <p>19 BY MR. KLATT:</p> <p>20 Q. When it's close together, you exclude the third one.</p> <p>21 When it's further apart, you --</p> <p>22 A. I did not say that.</p> <p>23 MS. O'DELL: Object to the form.</p> <p>24 BY MR. KLATT:</p> <p>25 Q. Then please explain numerically how you make the</p>	<p>1 RE-EXAMINATION BY MR. HEGARTY:</p> <p>2 Q. Doctor, I'm showing you what I'm marking as Exhibit 19.</p> <p>3 Do you recognize Exhibit 19?</p> <p>4 A. It looks like the abstract we submitted to SGO.</p> <p>5 Q. This abstract in the middle refers to testing done at</p> <p>6 48 hours; is that correct?</p> <p>7 A. 48 hours is a typo everywhere you see it, I acknowledge</p> <p>8 that.</p> <p>9 Q. So you reported 48 hours in this abstract to SGO?</p> <p>10 A. Correct. It is wrong. All the work that I did it's 72</p> <p>11 hours.</p> <p>12 SAED DEPOSITION EXHIBIT NUMBER 20,</p> <p>13 ABSTRACT,</p> <p>14 WAS MARKED BY THE REPORTER</p> <p>15 FOR IDENTIFICATION</p> <p>16 BY MR. HEGARTY:</p> <p>17 Q. I'm going to mark as Exhibit Number 20 another abstract</p> <p>18 of yours; is that correct?</p> <p>19 A. Where is it -- talcum powder -- where was this?</p> <p>20 Q. Do you recognize this abstract?</p> <p>21 A. March 2018, okay.</p> <p>22 Q. In the middle you report treating cells at 0, 200, and</p> <p>23 500 micrograms per milliliter; is that correct?</p> <p>24 A. Yes, that was the initial study that we did.</p> <p>25</p>
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<p>1 decision to exclude one of the three values --</p> <p>2 A. Okay.</p> <p>3 Q. -- or include it.</p> <p>4 A. One more time. So if the two number -- we have three</p> <p>5 numbers, right, three values. If two of the three</p> <p>6 values are very close, the closer they are together,</p> <p>7 and they are more further from the third one, that</p> <p>8 third one qualifies for outlier.</p> <p>9 Q. How close do the two have to be to exclude the third?</p> <p>10 A. Very close, have to be very close.</p> <p>11 Q. Numerically how --</p> <p>12 A. I don't know, I don't have a numerical value.</p> <p>13 Q. That's all the questions I have, Doctor.</p> <p>14 MR. HEGARTY: How much time do we have left?</p> <p>15 THE VIDEOGRAPHER: Two minutes left.</p> <p>16 MS. O'DELL: Do you have questions?</p> <p>17 MR. LOCKE: I do have a few.</p> <p>18 MS. O'DELL: You've got two minutes.</p> <p>19 MR. LOCKE: I know you've got some, too.</p> <p>20 MR. HEGARTY: I do.</p> <p>21 MR. LOCKE: Go ahead, Mark.</p> <p>22 SAED DEPOSITION EXHIBIT NUMBER 19,</p> <p>23 ABSTRACT SUBMITTED TO SGO,</p> <p>24 WAS MARKED BY THE REPORTER</p> <p>25 FOR IDENTIFICATION</p>	<p>1 Q. And that data is reflected in the notebooks we looked</p> <p>2 at?</p> <p>3 A. It's here, yes.</p> <p>4 MR. KLATT: Which notebook?</p> <p>5 MS. O'DELL: Exhibit 3.</p> <p>6 SAED DEPOSITION EXHIBIT NUMBER 21,</p> <p>7 ABSTRACT FROM SRI,</p> <p>8 WAS MARKED BY THE REPORTER</p> <p>9 FOR IDENTIFICATION</p> <p>10 BY MR. HEGARTY:</p> <p>11 Q. I'm going to mark next as Exhibit Number 21 another</p> <p>12 abstract of yours from SRI; is that correct?</p> <p>13 A. SRI, March 16, this one is -- what is the title --</p> <p>14 yeah, talcum powder -- yes.</p> <p>15 Q. In the method section you report treating cells with</p> <p>16 1,000 micrograms per milliliter of talc; is that</p> <p>17 correct?</p> <p>18 A. That's a typo that's 100.</p> <p>19 Q. That's another mistake?</p> <p>20 A. Yes, it's 100.</p> <p>21 MS. O'DELL: I think your time's gone.</p> <p>22 MR. HEGARTY: Okay. Well, we --</p> <p>23 THE WITNESS: And all those are the</p> <p>24 preliminary that we did.</p> <p>25 MR. HEGARTY: We have request for several</p>

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<p style="text-align: right;">Page 318</p> <p>1 documents to be produced, so we can go on the record 2 before we finish the deposition. And then, also, we 3 reserve the right, as we indicated at the beginning of 4 the deposition, to seek additional time because of the 5 late productions and, also, because of the 6 nonresponsive nature Dr. Saed has been throughout the 7 deposition. 8 MS. O'DELL: I think the objection for one 9 was objection for all, I think you made that rule, 10 Mike, but I'm glad you put -- we're going to go off the 11 record, and I may have a few questions for Dr. Saed. 12 Before I do, I will say I think to state that Dr. Saed 13 has not been responsive in his answers today is a 14 misstate. The record and his testimony will be 15 reflective that he was attempting to respond to the 16 questions, very difficult technical questions, and so 17 he's attempted to do his best, and as we said before, 18 we've complied with all the orders of the Court and the 19 Notice of Deposition, and we'll oppose efforts at this 20 point for any additional time with him. So let's go 21 off the record. 22 MR. HEGARTY: And to the extent that you 23 don't have any additional questions, I just want to go 24 back on the record and make a note of the additional 25 documents we want from Dr. Saed. We can do it now or</p>	<p style="text-align: right;">Page 320</p> <p>1 actually, maybe I should do it this way, I apologize. 2 If you would, let me hand to you what was marked as the 3 lab notebook for your -- the experiments that were done 4 to and reported on in your manuscript and your report, 5 Exhibit 1. Do you see those? 6 A. Yes. 7 Q. And if you turn to I think it was Page 57, Bates Number 8 57 -- make sure I'm at the right page. Let me know 9 when you get there, Doctor. 10 A. 57? 11 Q. Uh-huh. 12 A. This page? 13 Q. Maybe I wrote the page down -- oh, yeah, it's actually 14 84 in -- it's 57 in there and it's 84 in your main lab 15 notebook. You recall a number of questions about or 16 two questions at least that I recall, and it refers to 17 Page 84 in Exhibit 2 that corresponds to Bates Number 18 57 of Exhibit 1, do you recall that, and there was -- 19 you were asked about a missing data table -- 20 A. Correct. 21 Q. -- that did not make it into the scanned version. 22 A. Correct. 23 Q. Is the data contained in the table on Page 57 of the 24 scanned -- excuse me -- 84 of the lab notebook 25 contained in the figure below?</p>
<p style="text-align: right;">Page 319</p> <p>1 we can do it at the end. 2 MS. O'DELL: Why don't we wait until the end. 3 MR. HEGARTY: Okay. 4 THE VIDEOGRAPHER: Going off the record at 5 6:32 p.m. 6 (A short recess was taken.) 7 THE VIDEOGRAPHER: We're back on the record 8 at 6:56 p.m. 9 EXAMINATION BY MS. O'DELL: 10 Q. Doctor, I wanted to follow up on a few questions. 11 First, when you were acting as a consultant, you 12 referred to yourself as a consultant a number of times 13 today, was it your understanding as a consultant you 14 were also an expert witness? 15 A. Yes. 16 Q. And so during all the time that you were conducting the 17 studies that you testified to today, that you were 18 preparing certain publications, you were working as an 19 expert witness? 20 MR. KLATT: Objection, leading. 21 BY MS. O'DELL: 22 Q. Were you working during that time period as an expert 23 witness? 24 A. Yes. 25 Q. Okay. Let me see if I can direct you back to --</p>	<p style="text-align: right;">Page 321</p> <p>1 A. Yes. 2 Q. And was that figure included in the version that was 3 provided to defense counsel? 4 A. Yes. 5 Q. Okay. I've got one more situation like this. If 6 you'll turn to page -- let me get it -- it's 62 at the 7 Bates Stamp Number version, Exhibit 1, and for the lab 8 notebook it's Page 87. 9 A. Yes. 10 Q. And I think in this instance there was a table on 11 Page 87 of the lab notebook that was not scanned in the 12 electronic version. Is the data that's contained in 13 the table on Page 87 also in the figure that was 14 produced to Defendants? 15 MR. HEGARTY: Objection, form. You can 16 answer. 17 THE WITNESS: Yes. 18 BY MS. O'DELL: 19 Q. You were also asked a series of questions about your 20 manuscript and the use of the word marginal. Do you 21 recall that discussion? 22 A. Yes. 23 Q. What did you intend by the use of the word marginal? 24 A. I meant marked increase, marked difference. 25 Q. Okay. Let me change directions with you. We got your</p>

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<p style="text-align: right;">Page 322</p> <p>1 notebook that's been marked or two notebooks that have</p> <p>2 been marked Exhibit 11, and does that contain your</p> <p>3 expert report in this case as well as the references</p> <p>4 noted in your expert report?</p> <p>5 A. Correct.</p> <p>6 Q. And do you have any changes that you would like to make</p> <p>7 in your expert report?</p> <p>8 A. Yes, I do.</p> <p>9 Q. Okay.</p> <p>10 A. So I think during that note there were some references</p> <p>11 that were mislabeled, so I would like to --</p> <p>12 Q. Tell us what page you're on.</p> <p>13 A. Page 10, I'd like to add -- where it says 49, I would</p> <p>14 like to add 51 there.</p> <p>15 Q. And when you say 51, do go --</p> <p>16 A. Reference number 51.</p> <p>17 Q. Okay.</p> <p>18 A. Okay. And next page, Page 11, where it says 50 on the</p> <p>19 top of the page, first line, I'd like to add the NTP</p> <p>20 study 1993.</p> <p>21 Q. Okay.</p> <p>22 A. And on Page 12, I'd like to remove 4575.</p> <p>23 Q. Okay. And where is that on Page 12?</p> <p>24 A. On the middle paragraph.</p> <p>25 Q. All right.</p>	<p style="text-align: right;">Page 324</p> <p>1 BY MS. O'DELL:</p> <p>2 Q. You were asked a number of questions about your</p> <p>3 manuscript today. In your manuscript you state that</p> <p>4 your findings provide a molecular mechanism for linking</p> <p>5 genital talcum powder use to increased ovarian cancer</p> <p>6 risk?</p> <p>7 A. Yes.</p> <p>8 Q. And does that statement relate to the pathogenesis of</p> <p>9 ovarian cancer?</p> <p>10 A. Yes.</p> <p>11 Q. Does pathogenesis refer to the molecular mechanism that</p> <p>12 results in the development of a disease?</p> <p>13 A. Yes.</p> <p>14 Q. Also, in relation to your manuscript, has your</p> <p>15 manuscript been peer reviewed and accepted for</p> <p>16 publication?</p> <p>17 A. Yes.</p> <p>18 Q. Is the use of immortalized cells in laboratory research</p> <p>19 generally accepted in your field?</p> <p>20 A. Yes.</p> <p>21 MR. HEGARTY: Objection, form.</p> <p>22 BY MS. O'DELL:</p> <p>23 Q. Is it widely accepted?</p> <p>24 MR. HEGARTY: Objection, form.</p> <p>25 THE WITNESS: Yes.</p>
<p style="text-align: right;">Page 323</p> <p>1 MR. HEGARTY: I'm sorry, we're not getting</p> <p>2 realtime.</p> <p>3 MS. O'DELL: Let's go off the record. Do you</p> <p>4 need that or can we move on?</p> <p>5 MR. HEGARTY: No, I need it. I just wanted</p> <p>6 to see what he just said, and I can't, I obviously</p> <p>7 can't see it so --</p> <p>8 MS. O'DELL: Off the record.</p> <p>9 THE VIDEOGRAPHER: Going off the record at</p> <p>10 7:03 p.m.</p> <p>11 (An off-the-record discussion was held.)</p> <p>12 THE VIDEOGRAPHER: We're back on the record</p> <p>13 at 7:05 p.m.</p> <p>14 BY MS. O'DELL:</p> <p>15 Q. You may continue, Doctor?</p> <p>16 A. Yes. So the Page 12, the middle paragraph, I would</p> <p>17 like to delete references 4575 from the whole</p> <p>18 paragraph, they don't belong there.</p> <p>19 Q. Okay.</p> <p>20 A. That's it.</p> <p>21 Q. Anything else? Okay. Doctor, do in vitro models</p> <p>22 reliably predict the pathogenicity of potentially</p> <p>23 harmful particulates or other carcinogens in humans?</p> <p>24 MR. HEGARTY: Objection, form.</p> <p>25 THE WITNESS: Yes.</p>	<p style="text-align: right;">Page 325</p> <p>1 BY MS. O'DELL:</p> <p>2 Q. Is it a generally accepted practice for researchers in</p> <p>3 your field to correlate findings from immortalized</p> <p>4 cells to in vivo application in humans?</p> <p>5 A. Yes.</p> <p>6 Q. In terms of the studies that you have conducted on</p> <p>7 talc, you mentioned that you use multiple types --</p> <p>8 multiple lines of each type of cell; do you recall</p> <p>9 that?</p> <p>10 A. Yes.</p> <p>11 Q. How many lines of or types of ovarian cells did you</p> <p>12 use?</p> <p>13 A. Three different ovarian cancer cell lines and three</p> <p>14 different normal cell lines.</p> <p>15 Q. And what's the reason for doing that?</p> <p>16 A. The reason is to get a rebox finding to show that it is</p> <p>17 not repeated three times but the finding is reproduced</p> <p>18 from three different normal or three different ovarian.</p> <p>19 Q. And could another scientist with your expertise in and</p> <p>20 background in research, could they replicate the</p> <p>21 studies that you've conducted?</p> <p>22 A. Yes.</p> <p>23 Q. In terms of the outcomes for oxidative stress and</p> <p>24 inflammation that you saw demonstrated in your studies,</p> <p>25 are there any alternative explanations for those</p>

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<p style="text-align: right;">Page 326</p> <p>1 results?</p> <p>2 MR. HEGARTY: Objection, form.</p> <p>3 THE WITNESS: That talcum powder induces</p> <p>4 inflammation that leads to increased risk of ovarian</p> <p>5 cancer.</p> <p>6 BY MS. O'DELL:</p> <p>7 Q. Are there any other alternative explanations other than</p> <p>8 the presence of talc treating a cell?</p> <p>9 A. This is a direct experiment showing isolated effect.</p> <p>10 Q. Based on your academic training and years of experience</p> <p>11 studying ovarian cancer, does the cause and effect</p> <p>12 observed in your studies make sense?</p> <p>13 MR. HEGARTY: Objection, form.</p> <p>14 THE WITNESS: It does.</p> <p>15 BY MS. O'DELL:</p> <p>16 Q. In terms of the particular data that you evaluated, I</p> <p>17 want to ask you to take a look at I think it was Bates</p> <p>18 Number Page 11 of Exhibit 1, and you were asked some</p> <p>19 questions about occasions when you averaged two</p> <p>20 findings?</p> <p>21 A. Outliers.</p> <p>22 Q. Yes. So address the outliers --</p> <p>23 A. Yeah, so what I forgot to say that when I was asked</p> <p>24 by -- this whole statistics, I did not touch. This was</p> <p>25 done by a professional, by a statistician, and the</p>	<p style="text-align: right;">Page 328</p> <p>1 RE-EXAMINATION BY MR. HEGARTY:</p> <p>2 Q. Doctor, in connection with your work in this</p> <p>3 litigation, did the lawyers for Plaintiff provide you</p> <p>4 with any medical or scientific literature?</p> <p>5 A. No.</p> <p>6 Q. So none of the materials we marked as Exhibit Number 11</p> <p>7 were provided by Counsel for Plaintiffs?</p> <p>8 MS. O'DELL: Object to the form.</p> <p>9 THE WITNESS: Yeah, this was copied and</p> <p>10 provided by them, the references I made.</p> <p>11 BY MR. HEGARTY:</p> <p>12 Q. In connection with you -- strike that. In connection</p> <p>13 with any other testing you have done involving cell</p> <p>14 cultures, have you ever served as an expert witness or</p> <p>15 a consultant in litigation involving the same topic of</p> <p>16 those experiments?</p> <p>17 MS. O'DELL: Object to the form.</p> <p>18 THE WITNESS: I never served, as I stated, as</p> <p>19 an expert witness in any litigation.</p> <p>20 BY MR. HEGARTY:</p> <p>21 Q. In connection with any experimental testing you've done</p> <p>22 involving cell cultures, have you ever served as a paid</p> <p>23 expert for plaintiffs lawyers on the same topic for</p> <p>24 which you were doing those experiments?</p> <p>25 MS. O'DELL: Object to the form.</p>
<p style="text-align: right;">Page 327</p> <p>1 results, his finding is in the section in the notebook.</p> <p>2 He determined everything.</p> <p>3 Q. Would you have published your results even if they had</p> <p>4 shown there was no biological effect?</p> <p>5 MR. HEGARTY: Objection, form.</p> <p>6 THE WITNESS: Of course.</p> <p>7 BY MS. O'DELL:</p> <p>8 Q. Is it a standard cell culture technique generally</p> <p>9 accepted in your field to split the cell culture right</p> <p>10 after the cells have -- (coughing in room) -- in a</p> <p>11 24-hour period?</p> <p>12 A. It is.</p> <p>13 Q. Is it a standard cell culture technique that's</p> <p>14 generally accepted in your field to start experiments</p> <p>15 right after splitting the cells?</p> <p>16 A. Cells have to reach confluency and then you split them,</p> <p>17 yes.</p> <p>18 Q. And it's generally accepted to begin your experiments</p> <p>19 right after that point?</p> <p>20 A. Correct.</p> <p>21 MS. O'DELL: Nothing further.</p> <p>22 How long was that?</p> <p>23 THE VIDEOGRAPHER: 14 minutes.</p> <p>24 MR. HEGARTY: Give me a second.</p> <p>25</p>	<p style="text-align: right;">Page 329</p> <p>1 THE WITNESS: Have I been hired by and paid</p> <p>2 for by another? I'm sorry --</p> <p>3 BY MR. HEGARTY:</p> <p>4 Q. Other lawyers at the same time you were doing cell</p> <p>5 culture tests involving the same topic that you were</p> <p>6 consulting with them on.</p> <p>7 MS. O'DELL: Object to the form.</p> <p>8 THE WITNESS: No.</p> <p>9 BY MR. HEGARTY:</p> <p>10 Q. You said in response to counsel's question that when</p> <p>11 you used the word marginal, you meant marked. What</p> <p>12 is -- where is a written definition for marked?</p> <p>13 A. Marked.</p> <p>14 Q. I think I said that, but where is a published standard</p> <p>15 for what marked means?</p> <p>16 A. This is marked is to me, but we can go the</p> <p>17 statistically significance. To me, when you have an</p> <p>18 increase of 1 versus 6 fold, that's a marked increase.</p> <p>19 Q. Is there a written standard for what constitutes a</p> <p>20 marked increase?</p> <p>21 A. No.</p> <p>22 MS. O'DELL: Object to the form.</p> <p>23 BY MR. HEGARTY:</p> <p>24 Q. When I asked you not long ago if you had any revisions</p> <p>25 to your expert report, you answered no. Do you recall</p>

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<p>1 telling me that?</p> <p>2 MS. O'DELL: I don't recall the question</p> <p>3 being asked.</p> <p>4 BY MR. HEGARTY:</p> <p>5 Q. I did ask. I asked you, Doctor, didn't I, if you had</p> <p>6 any -- if you needed to revise in any way your report.</p> <p>7 Do you recall me asking that?</p> <p>8 MS. O'DELL: Object to the form.</p> <p>9 THE WITNESS: Probably I forgot that those</p> <p>10 references need to be done.</p> <p>11 BY MR. HEGARTY:</p> <p>12 Q. When did this revelation come to you?</p> <p>13 A. I mean I don't --</p> <p>14 MS. O'DELL: Object to the form.</p> <p>15 THE WITNESS: I'm not sure, we've been</p> <p>16 through many, many, many questions, so I don't really</p> <p>17 remember be accurately.</p> <p>18 BY MR. HEGARTY:</p> <p>19 Q. Well, I asked that you question about --</p> <p>20 A. Make you did, I'm not denying, maybe you did, but I'm</p> <p>21 saying there are too many things that we're covering</p> <p>22 today in very small time.</p> <p>23 Q. Well, did you discover the need to make those revisions</p> <p>24 before today?</p> <p>25 A. Yes, they actually they were marked in my -- with my</p>	<p>1 A. What's the name of the lady I met today --</p> <p>2 MS. O'DELL: Michelle.</p> <p>3 THE WITNESS: Michelle, I just met her today.</p> <p>4 Sorry, I'm not good at names.</p> <p>5 MS. O'DELL: Alastair.</p> <p>6 THE WITNESS: And Alastair, we met today.</p> <p>7 BY MR. HEGARTY:</p> <p>8 Q. You testified a moment ago that an in vitro model</p> <p>9 reliably predicts that, I think, pathogenesis of</p> <p>10 potentially harmful particles and other carcinogens --</p> <p>11 let me back up and find that testimony -- you said</p> <p>12 do -- you agreed with the question that in vitro models</p> <p>13 reliably predict the pathogenesis of potentially</p> <p>14 harmful particulates or other carcinogens in humans.</p> <p>15 Do you recall agreeing with that statement?</p> <p>16 A. Yes.</p> <p>17 Q. What data does it take for an in vitro model to</p> <p>18 reliably predict the carcinogenicity of a particle?</p> <p>19 A. What data?</p> <p>20 Q. Is it your testimony that in vitro models by themselves</p> <p>21 reliably predict the carcinogenicity of a particle to a</p> <p>22 human?</p> <p>23 A. Yes.</p> <p>24 MS. O'DELL: Object to the form.</p> <p>25 THE WITNESS: They do.</p>
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<p>1 handwriting, this is my handwriting, they were marked</p> <p>2 with my handwriting.</p> <p>3 Q. When did you make those handwritten marks?</p> <p>4 A. Last night, I was reviewing this, and I -- what I</p> <p>5 understood maybe your question as if I want to make</p> <p>6 something to the text, but this is like probably the</p> <p>7 end notes without the references.</p> <p>8 Q. Did you meet with counsel for Plaintiffs yesterday?</p> <p>9 A. Did I meet with -- yes, I did.</p> <p>10 Q. For how long?</p> <p>11 A. I can't remember, three, four hours, five hours, I</p> <p>12 don't know.</p> <p>13 Q. From when to when?</p> <p>14 A. When was it, 10 maybe to 2, 3.</p> <p>15 Q. Who did you meet with?</p> <p>16 A. The three -- Leigh, Margaret, John, right, and who</p> <p>17 else -- I think that's it right, I don't remember,</p> <p>18 Leigh, Margaret, John, and Dan.</p> <p>19 Q. At any point in time during your consultation with</p> <p>20 Plaintiff's Counsel, have you met with any other</p> <p>21 lawyers that you've not identified here today?</p> <p>22 A. Have I met at any point?</p> <p>23 Q. At any point.</p> <p>24 A. I met Allison, right?</p> <p>25 Q. Any others who we haven't talked about?</p>	<p>1 BY MR. HEGARTY:</p> <p>2 Q. Cite for me an instance when a carcinogen has been</p> <p>3 identified in humans based solely on an in vitro model.</p> <p>4 A. I can't remember.</p> <p>5 Q. When have you ever classified a substance as a</p> <p>6 carcinogen based on the result in an in vitro model?</p> <p>7 A. In vitro model is a good predictor to determine whether</p> <p>8 a substance is carcinogenic or not, if the same effect</p> <p>9 is replicated in vivo.</p> <p>10 Q. You did not replicate your results in an in vivo model,</p> <p>11 correct?</p> <p>12 A. Not yet.</p> <p>13 Q. You were asked with regard to your experimental results</p> <p>14 whether there was any other alternative explanation for</p> <p>15 the results. What did you do to rule out alternative</p> <p>16 explanations for the results that you found in your</p> <p>17 testing?</p> <p>18 A. Because treatment without talc did not induce it, we're</p> <p>19 doing a comparison, very simple comparison with and</p> <p>20 without, and with did this, without, this didn't do.</p> <p>21 Q. You claim that your test results show that talc</p> <p>22 increases the risk of ovarian cancer. How did you show</p> <p>23 by your test results that talc increases the risk --</p> <p>24 I'm sorry -- yeah, increases the risk of ovarian</p> <p>25 cancer?</p>

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<p style="text-align: right;">Page 334</p> <p>1 A. One more time, please.</p> <p>2 Q. How do you remember test results show that talc</p> <p>3 increases the risk of ovarian cancer?</p> <p>4 A. By showing that the treatment with talcum powder</p> <p>5 induces the same oxidative oxidant and anti-oxidant</p> <p>6 profile that we observe in epithelial ovarian cancer</p> <p>7 cells.</p> <p>8 Q. But no study has shown those results in women using</p> <p>9 cosmetic talc, correct?</p> <p>10 MS. O'DELL: Object to the form.</p> <p>11 THE WITNESS: So you're saying there's no</p> <p>12 studies out there showing woman using the talc powder</p> <p>13 have increased any of these markers?</p> <p>14 BY MR. HEGARTY:</p> <p>15 Q. Correct.</p> <p>16 A. I think you asked me the same question before.</p> <p>17 Q. Let me ask it a different way, if you -- I already</p> <p>18 asked you the same question. How do you go from your</p> <p>19 test results to concluding there's an increased risk of</p> <p>20 cancer with applying talc to the body?</p> <p>21 MS. O'DELL: Object to the form.</p> <p>22 THE WITNESS: Again, as I stated, the</p> <p>23 treatment of ovarian cancer cells, three different</p> <p>24 ovarian cancer cell lines and three different normal</p> <p>25 cells with talcum powder induces a profile of oxidative</p>	<p style="text-align: right;">Page 336</p> <p>1 I don't understand what you're trying to do, seriously.</p> <p>2 BY MR. HEGARTY:</p> <p>3 Q. Well, have you ever reported finding a pro-oxidative or</p> <p>4 an anti-oxidative state in normal ovarian cells?</p> <p>5 MS. O'DELL: Object to the form.</p> <p>6 THE WITNESS: As compared to what?</p> <p>7 BY MR. HEGARTY:</p> <p>8 Q. As compared to nothing.</p> <p>9 A. How you not compare to nothing?</p> <p>10 Q. Right.</p> <p>11 A. So we comparing ovarian cancer to normal cells.</p> <p>12 Q. My question is simply in normal cells, have you ever</p> <p>13 found pro-oxidative or anti-oxidative state?</p> <p>14 A. We found -- okay, maybe I know what you want me to say.</p> <p>15 So there are the players, the key oxidants and key</p> <p>16 anti-oxidants, they are expressed in all cells</p> <p>17 including normal. Now, the amount of -- the degree of</p> <p>18 expression, that what gets screwed up and altered when</p> <p>19 you develop -- you start -- cells start developing that</p> <p>20 oncogenesis phenotype.</p> <p>21 Q. I need to leave Mr. Klatt a minute or two. You</p> <p>22 mentioned that you would still have published your</p> <p>23 article if you found no biologic effect. Do you recall</p> <p>24 answering that question?</p> <p>25 A. Correct.</p>
<p style="text-align: right;">Page 335</p> <p>1 stress that we in our lab have extensively published</p> <p>2 and characterized for ovarian cancer cells.</p> <p>3 BY MR. HEGARTY:</p> <p>4 Q. You characterized that state in ovarian cancer cells,</p> <p>5 correct?</p> <p>6 MS. O'DELL: I'm sorry --</p> <p>7 THE WITNESS: State?</p> <p>8 BY MR. HEGARTY:</p> <p>9 Q. Well, the pro-oxidant and anti-oxidant state, you've</p> <p>10 characterized that to exist in ovarian cancer cells,</p> <p>11 correct?</p> <p>12 A. We characterized that there is an enhanced pro-oxidant</p> <p>13 state in -- that manifest in ovarian cancer cells, yes.</p> <p>14 Q. You've not done any studies showing a pro-oxidant or</p> <p>15 decreased anti-oxidant state in normal ovarian cancer</p> <p>16 cells, correct?</p> <p>17 MS. O'DELL: Object to the form.</p> <p>18 THE WITNESS: Normal ovarian cancer?</p> <p>19 BY MR. HEGARTY:</p> <p>20 Q. Yes. I'm sorry -- you have not shown a pro-oxidative</p> <p>21 or anti-oxidative state in normal ovarian cells?</p> <p>22 A. In response to what?</p> <p>23 Q. In response to anything.</p> <p>24 MS. O'DELL: Object to the form.</p> <p>25 THE WITNESS: That's a very vague question.</p>	<p style="text-align: right;">Page 337</p> <p>1 Q. Is it your belief that anyone would publish your paper</p> <p>2 if you showed no biologic effect?</p> <p>3 MS. O'DELL: Object to the form.</p> <p>4 THE WITNESS: Anyone not me, you talking</p> <p>5 about me?</p> <p>6 BY MR. HEGARTY:</p> <p>7 Q. Yes, any publisher.</p> <p>8 A. That it would be published, yes, I would consider this</p> <p>9 a very positive and very negative, same thing.</p> <p>10 Q. But do you think a journal would publish --</p> <p>11 A. Absolutely, it's a finding.</p> <p>12 Q. What is that based on?</p> <p>13 A. It's a finding.</p> <p>14 Q. Have you ever approached a journal and had them publish</p> <p>15 an article on a negative finding?</p> <p>16 A. I don't know what you call negative.</p> <p>17 Q. Well, showing no biologic --</p> <p>18 A. That's not negative, that's a huge finding.</p> <p>19 Q. Okay. All right.</p> <p>20 You have questions, Mike? Go ahead.</p> <p>21 RE-EXAMINATION BY MR. KLATT:</p> <p>22 Q. Dr. Saed, are you aware that a plaintiff's expert named</p> <p>23 John Godlesky has tested dozens of women's ovarian,</p> <p>24 reproductive, and peritoneal tissue, and found many,</p> <p>25 many nontalc particles, foreign particles in that</p>

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<p style="text-align: right;">Page 338</p> <p>1 tissue; are you aware of that?</p> <p>2 A. No.</p> <p>3 Q. If you tested those other foreign particles that aren't</p> <p>4 talc in the same test that you tested talc, could you</p> <p>5 get the same results?</p> <p>6 MS. O'DELL: Object to the form.</p> <p>7 THE WITNESS: I didn't test them.</p> <p>8 BY MR. KLATT:</p> <p>9 Q. But is it possible that if you tested them, you could</p> <p>10 get the same results?</p> <p>11 A. If I didn't test them, I will not give you an answer.</p> <p>12 Q. I'm sorry?</p> <p>13 A. I did not test them.</p> <p>14 Q. So you have no idea whether any other foreign particle</p> <p>15 other than talc would result in the same findings you</p> <p>16 found for talc, correct?</p> <p>17 MS. O'DELL: Object to the form.</p> <p>18 BY MR. KLATT:</p> <p>19 Q. Because you haven't done the test.</p> <p>20 A. When I test, I will tell you.</p> <p>21 Q. So you can't give us any information on what any other</p> <p>22 particles other than talc would do under the tests that</p> <p>23 you -- let me finish -- the tests that you submitted</p> <p>24 talc to, correct?</p> <p>25 MS. O'DELL: Object to the form.</p>	<p style="text-align: right;">Page 340</p> <p>1 many questions as I can in 20 seconds. You're the</p> <p>2 first expert to reach the conclusions that you have in</p> <p>3 your report, is that correct?</p> <p>4 MS. O'DELL: Object to the form.</p> <p>5 THE WITNESS: That were looking at the</p> <p>6 molecular mechanism and molecular effect of talcum</p> <p>7 powder?</p> <p>8 BY MR. LOCKE:</p> <p>9 Q. Right.</p> <p>10 A. I wasn't the first one.</p> <p>11 Q. Who did it before?</p> <p>12 A. Was Shukla and there was the -- what was the other guy</p> <p>13 name, I can't remember names, but there were two or</p> <p>14 three papers that look at molecular mechanisms,</p> <p>15 molecular effects.</p> <p>16 Q. Okay.</p> <p>17 MS. O'DELL: I'm sorry, time's up.</p> <p>18 MR. LOCKE: I'm going to still object to not</p> <p>19 being able to ask a couple quick questions here.</p> <p>20 MS. O'DELL: Tom, I'm sorry, I mean this</p> <p>21 is between --</p> <p>22 MR. LOCKE: You're cutting me off.</p> <p>23 MS. O'DELL: I've tried to be very</p> <p>24 accommodating, but this is between you and your</p> <p>25 co-counsel.</p>
<p style="text-align: right;">Page 339</p> <p>1 THE WITNESS: I only can give you information</p> <p>2 to the experiments that I did and --</p> <p>3 BY MR. KLATT:</p> <p>4 Q. And you didn't do any tests on any foreign particles</p> <p>5 other than talc, correct?</p> <p>6 A. Correct.</p> <p>7 Q. And has all your testing on talc been paid for by the</p> <p>8 Beasley Allen firm?</p> <p>9 MS. O'DELL: Object to the form.</p> <p>10 THE WITNESS: My time?</p> <p>11 BY MR. KLATT:</p> <p>12 Q. Well, the testing, yeah, the time that you spent</p> <p>13 testing talc.</p> <p>14 MS. O'DELL: Object to the form.</p> <p>15 THE WITNESS: No, testing is not -- what are</p> <p>16 you trying to -- we already discussed this. Time, they</p> <p>17 paid for my time for consultation, I paid for the</p> <p>18 expenses from the lab. We already talked about that.</p> <p>19 MR. KLATT: Okay. Anybody else?</p> <p>20 MR. LOCKE: Yeah. Are you finished?</p> <p>21 MR. KLATT: Yes.</p> <p>22 EXAMINATION BY MR. LOCKE:</p> <p>23 Q. I just want to clarify for you, Doctor --</p> <p>24 MS. O'DELL: You've got 20 seconds.</p> <p>25 MR. LOCKE: Okay, well, I'm going to ask as</p>	<p style="text-align: right;">Page 341</p> <p>1 MR. LOCKE: No, it's really not.</p> <p>2 MS. O'DELL: Yes, it is, it is.</p> <p>3 MR. LOCKE: Okay. We'll be back with this</p> <p>4 witness.</p> <p>5 MR. HEGARTY: Do you have anything further?</p> <p>6 MS. O'DELL: I have nothing further.</p> <p>7 MR. HEGARTY: I just want to put on the</p> <p>8 record several document requests, and I certainly don't</p> <p>9 expect you to agree to them right now.</p> <p>10 We would like copies of Dr. Saed's prior</p> <p>11 drafts of his manuscript; copies of any correspondence</p> <p>12 with OB-GYN Oncology and its reviewers, whether it's in</p> <p>13 his possession or maintained on a website; any cover</p> <p>14 letters accompanying submissions of the manuscript to</p> <p>15 either OB-GYN Oncology or Reproductive Sciences; all</p> <p>16 communications with Dr. Saed, between Dr. Saed and</p> <p>17 Beasley Allen and other plaintiffs lawyers with regard</p> <p>18 to his manuscript; and the budget that Dr. Saed</p> <p>19 prepared for his manuscript; as well as all accounting</p> <p>20 documents, invoices, or other original documents that</p> <p>21 memorialize the expenses, costs, et cetera, hours</p> <p>22 worked on the manuscript that we -- that are reported</p> <p>23 in Exhibit Number 5.</p> <p>24 MS. O'DELL: You're referring to the budget</p> <p>25 officer at Wayne State?</p>

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<p style="text-align: right;">Page 342</p> <p>1 MR. HEGARTY: Correct, and the documents that</p> <p>2 Sharon Pepe used to put together the numbers that are</p> <p>3 reported in that exhibit. And those are at least the</p> <p>4 document requests that I can think of right now, but we</p> <p>5 reserve the right to go back and look at the transcript</p> <p>6 to see if there are any additional requests, and we</p> <p>7 will make them in a timely manner.</p> <p>8 MS. O'DELL: We will be happy to meet and</p> <p>9 confer on all of those items, some of which we might</p> <p>10 work an agreement out, some of which we might need some</p> <p>11 assistance by the Court.</p> <p>12 THE VIDEOGRAPHER: This concludes the</p> <p>13 deposition. We're going off the record at 7:29 p.m.</p> <p>14 (The deposition was concluded at 7:29 p.m.)</p> <p>15</p> <p>16</p> <p>17</p> <p>18</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p>	<p>1 -----</p> <p>2 E R R A T A</p> <p>3 -----</p> <p>3 PAGE LINE CHANGE</p> <p>4</p> <p>5 REASON: _____</p> <p>6</p> <p>7 REASON: _____</p> <p>8</p> <p>9 REASON: _____</p> <p>10</p> <p>11 REASON: _____</p> <p>12</p> <p>13 REASON: _____</p> <p>14</p> <p>15 REASON: _____</p> <p>16</p> <p>17 REASON: _____</p> <p>18</p> <p>19 REASON: _____</p> <p>20</p> <p>21 REASON: _____</p> <p>22</p> <p>23 REASON: _____</p> <p>24</p> <p>25 REASON: _____</p>
<p style="text-align: right;">Page 343</p> <p>1 CERTIFICATE OF NOTARY</p> <p>2</p> <p>3 STATE OF MICHIGAN)</p> <p>4) SS</p> <p>5 COUNTY OF OAKLAND)</p> <p>6 I, Laurel A. Frogner, Certified Shorthand</p> <p>7 Reporter, a Notary Public in and for the above county</p> <p>8 and state, do hereby certify that the above deposition</p> <p>9 was taken before me at the time and place hereinbefore</p> <p>10 set forth; that the witness was by me first duly sworn</p> <p>11 to testify to the truth, and nothing but the truth,</p> <p>12 that the foregoing questions asked and answers made by</p> <p>13 the witness were duly recorded by me stenographically</p> <p>14 and reduced to computer transcription; that this is a</p> <p>15 true, full and correct transcript of my stenographic</p> <p>16 notes so taken; and that I am not related to, nor of</p> <p>17 counsel to any party, nor interested in the event of</p> <p>18 this cause.</p> <p>19</p> <p>20</p> <p>21 Laurel A. Frogner, CSR-2495, RMR, CRR</p> <p>22 Notary Public,</p> <p>23 Oakland County, Michigan</p> <p>24 My Commission expires: 4-22-2022</p> <p>25</p>	<p>1 ACKNOWLEDGMENT OF DEPONENT</p> <p>2</p> <p>3 I, _____, do</p> <p>4 hereby certify that I have read the</p> <p>5 foregoing pages, and that the same</p> <p>6 is a correct transcription of the answers</p> <p>7 given by me to the questions therein</p> <p>8 propounded, except for the corrections or</p> <p>9 changes in form or substance, if any,</p> <p>10 noted in the attached Errata Sheet.</p> <p>11</p> <p>12 _____</p> <p>13 Ghassan Saed, Ph.D. DATE</p> <p>14</p> <p>15 Subscribed and sworn</p> <p>16 to before me this</p> <p>17 _____ day of _____, 20____.</p> <p>18 My commission expires: _____</p> <p>19 _____</p> <p>20 Notary Public</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p>

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Exhibit 30

**UNITED STATES DISTRICT COURT
DISTRICT OF NEW JERSEY**

**IN RE JOHNSON & JOHNSON
TALCUM POWDER PRODUCTS
MARKETING, SALES PRACTICES,
AND PRODUCTS LIABILITY
LITIGATION**

MDL NO. 16-2738 (FLW) (LHG)

THIS DOCUMENT RELATES TO ALL CASES

**RULE 26 EXPERT REPORT OF
JACK SIEMIATYCKI MSc, PhD**



Date: November 16, 2018

Jack Siemiatycki MSc, PhD

EXPERT REPORT OF JACK SIEMIATYCKI MSc, PhD
On
TALCUM POWDER USE AND OVARIAN CANCER

Jack Siemiatycki, MSc, PhD, FCAHS

106 Columbia Avenue

Westmount, Quebec, Canada

November 16, 2018

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Report on talcum powder use and ovarian cancer

Jack Siemiatycki

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1. My mandate

I have been retained to assess the epidemiologic evidence regarding the **general causation** between perineal (or genital) use of talcum powder products and risk of ovarian cancer. The question is: "Can application of talcum powder products in the perineal region cause ovarian cancer?"

All of my opinions in this report are stated to a reasonable degree of scientific certainty.

2. My credentials, expertise and experience

I am a tenured Professor of epidemiology at the University of Montreal and an Adjunct Professor of epidemiology at McGill University in Montreal. I have received prestigious national research awards in Canada, such as National Health Scientist Salary Award, Medical Research Council Distinguished Scientist Award, Canada Research Chair in Environment and Cancer and, currently, I hold the Guzzo-Cancer Research Society Chair in Environment and Cancer. I am an elected fellow of the Canadian Academy of Health Sciences. I was awarded a lifetime achievement award by the Canadian Society for Epidemiology and Biostatistics, the premier professional organisation in our discipline.

Trained in statistics and in epidemiology, I have devoted most of my research career to investigating links between environmental, occupational and lifestyle factors and various types of cancer. My research has been both substantive – namely, looking at particular factors and their possible relationship to particular cancers - and methodological – namely, exploring how to evaluate and enhance the validity of epidemiologic research through various prisms: study design, data collection methods and statistical analysis. Of my approximately 250 research publications, about one quarter would be considered to have methodological focus.

I have held various leadership positions, including the elected presidency of the Canadian Society for Epidemiology and Biostatistics, and elected membership on the Board of the American College of Epidemiology. I have been invited to serve on over 160 Boards, Scientific Councils and Expert Panels for a host of governments, universities or research agencies. Examples include: Board of Directors of the Canadian National Cancer Institute, member of expert panel tasked with recommending priorities for action under the

Canadian Environmental Protection Act, member of external peer review panel of the Epidemiology branch of the US National Cancer Institute (NCI), member of two different expert advisory bodies to research projects at the NCI, consulted by President Clinton's Cancer panel, member of external peer review panel for the Helmholtz German national medical research agency, Chair of the Scientific Council of the largest prospective study of causes of cancer being conducted in France, and others of that nature.

I have been associate editor of the American Journal of Epidemiology and the International Journal of Environmental Health. In addition, I have served as reviewer for about 20 journals. I have served as a chair and as a member of grant review panels for major Canadian scientific funding agencies.

My research programme has been well funded by Canadian funding agencies for over 35 years. I have conducted research and published on the carcinogenicity of a large number of agents in the occupational environment (e.g. asbestos, silica, welding fumes) and in the general environment (e.g. smoke from wood stoves, urban air pollution) and lifestyle factors (e.g. smoking, alcohol, use of cell phones).

I have taught and supervised epidemiology students and many of my former trainees are now faculty members in universities around the world.

I have had a long association with the International Agency for Research on Cancer (IARC). IARC is the premier institution in the world for cancer epidemiology and for environment and cancer research. It has several mandates, including the organisation and compilation of standardised high quality data on cancer incidence around the world, the conduct of original research, and the evaluation of the carcinogenicity of different agents with which humans come into contact. The latter is achieved through a process that involves identifying chemical or physical agents for evaluation, convening specially selected international expert panels that are mandated to review all pertinent evidence on the topic and write a thorough review culminating in an evaluation of whether the agent(s) are human carcinogens. Since the inception of this program in 1971, there have been about 120 meetings held and approximately 1100 agents have been evaluated.

A particular point of pride for me is that over the years, research results from my team have been cited as part of the information base on 69 of the 1100 agents that have been evaluated, probably making my team the most cited epidemiology team in the history of the IARC Monograph program.

My association with IARC began when I did a post-doctoral fellowship there in 1977-79. Over the intervening years I have collaborated with scientists at IARC on various research projects. I was a member of the 18-member Scientific Council of IARC from 2006 to 2010 including two years as elected Chairman of the Council. The Scientific Council oversees all of the scientific activities at IARC; its members are named by the member states of IARC. I have been invited to sit on IARC Monograph international expert panels for 5 of the 60 panels convened in the past 25 years. One of the IARC Monograph panels of which I was a member was tasked with evaluating: "Carbon black, titanium dioxide and non-asbestiform talc." Out of the 16 invited experts who participated in the meeting as members of the Working Group, I was selected to chair the meeting.

Subsequent to the IARC meeting and the report of the meeting, a small subgroup of members of the IARC Working Group, of which I was a member, conducted and published a meta-analysis of the results of the studies that had been available to the IARC Working Group (Langseth, 2008)

Although I have not personally produced original data collection studies on the topic, I am well qualified to review the epidemiologic evidence. I have participated in two published reviews of the issue. The methodologic expertise and analytical skills required to critically review and evaluate such evidence is generic to the vast area of environmental epidemiology of cancer. I am routinely asked by journals and grant agencies to provide expert opinions on topics for which I have not produced original data collection studies, but that are within the purview of my expertise. The invitation by IARC to chair the meeting at which talc was evaluated is testimony to the fact that my competence and expertise in this matter are internationally recognized by peers. I do not claim expertise in various adjoining domains that inform this issue, including physiology, pathology, clinical oncology, experimental toxicology, geology and mineral chemistry. However, I do have the

expertise and skill to assimilate information that is provided by experts in these areas. I have previously submitted a report on my review of the evidence regarding talcum powder products and ovarian cancer in October 2016.

I have previously served as an expert witness for plaintiffs in one U.S. court case, and that was a talc litigation in Los Angeles in 2017. (Eva Echeverria, BC628228, Johnson and Johnson Talcum Powder Cases, CA JCCP No. 4872), and I testified that the genital use of talcum powder products can cause ovarian cancer.

I have served as an expert witness in two Canadian court cases, neither having to do with talc or hygiene powders or ovarian cancer. One case dealt with a class action lawsuit on behalf of a town in Canada adjoining a Canadian military base where there had allegedly been a spill of trichloroethylene that seeped into the water table of the town. The residents claimed that the contamination had caused cases of cancer. I was an expert for the defence, the Canadian government, and I testified in 2012. (Province of Quebec Superior Court file 200-06-000038-037).

The other case was a class action on behalf of Quebec residents who contracted cancer and had been smokers, claiming that the tobacco companies were responsible for their diseases. I was an expert for the plaintiffs and I testified in 2014. (Province of Quebec Superior Court file 500-06-000076-980).

In my work as an expert for legal cases, my time is billed at the rate of \$450 per hour for research, report preparation, communications with counsel, participation in depositions, and testimony in court.

3. Overview of my methodology

The basis of my opinions derive from my education, training, experience, research and what is accepted within the community of leading scientists practicing in the field of epidemiology. My opinions are based on my review of the relevant materials, published in the scientific literature and/or produced in this case; including internal company documents, as well as relevant depositions, reports and testimony in the talcum powder product litigation. To reach my conclusions, I have employed the same scientific

methodology and rigor that I use in my research, in my publications and in the consulting and advising that I carry out on behalf of governments, public health agencies and research institutes. This includes a review of the relevant published literature, expert judgment to assess the quality and meaning of the various studies that were reviewed, and syntheses of the available evidence and any other pertinent medical and scientific evidence of which I am aware. The methods I used to derive and present my opinions are those used in general in the assessment of causal relations in medicine and public health, and more specifically in epidemiology. The methods are based on the experience and insight I have accumulated over 40 years of research, consulting, reviewing and student supervision, from discussions and interactions with leading epidemiologists, service on multiple IARC panels, and from reading evolving ideas in the scientific literature, including such seminal works as Bradford Hill's (Hill 1965) writings on assessing causality.

My opinions may be further supplemented and refined, subject to results that may come from further medical and scientific study and research and the continued review of additional information and discovery materials produced in this litigation.

4. The science of epidemiology

This section is designed to provide a non-specialist reader with information and definitions about epidemiology and biostatistics that are needed to understand the basis of my evaluation on talcum powder products and ovarian cancer. I do not present in this section the actual data and evidence regarding talcum powder products and ovarian cancer.

Epidemiology is the science of occurrence of diseases in human populations. It is concerned with the patterns of disease occurrence and also with identifying the factors that influence disease occurrence. These two sets of concerns are sometimes referred to respectively as descriptive epidemiology and analytic epidemiology. The first addresses such issues as the incidence of the disease in different geographic areas, in different time periods, or at different ages and sexes. The second addresses more focused questions on the specific environmental and/or lifestyle and/or genetic factors that might influence the incidence of disease.

The word “epidemiology” has the same etymologic roots as the word “epidemic”, which signifies that, initially, epidemiology grew out of the study of epidemics. Such epidemics were often of a microbial origin (e.g. viruses, bacteria, parasites). But increasingly in the 19th and especially in the 20th century, it became clear that the etiology (i.e. causation) of chronic diseases such as cancer could also be elucidated by studying their patterns of occurrence.

While there were many studies carried out in the early to mid-20th century that we would now qualify as epidemiological in nature, the discipline of epidemiology and its methods started to become formalized in the 1950’s and 1960’s. There are now departments of epidemiology in most large universities that have health science research and teaching activities and there are many national and international societies of epidemiology.

Epidemiology is characterized by its mainly observational and non-experimental approaches. It is a discipline that is not primarily based in the laboratory; rather it is based in society. That is the source of its strength, and its weakness. Because it deals with people in the reality of their lives, it is the most pertinent approach to understanding the links between people’s lifestyles and environments and their health and disease. However, because it is based in society, it by necessity confronts the extreme complexity of human lifestyles, environments and diseases. And because we cannot experiment with people’s lives, we cannot control the conditions in which people are exposed. The methods of epidemiologic research are complex and differ from study to study. Statistical methods play an important role in trying to tease out the role of different variables and in determining whether the observed results may be attributable to chance, to bias or to real effects of putative risk factors. It is usually necessary to assemble evidence from several data-collection studies on a given topic before being able to draw inferences about causality.

4.1 Some basic measures and notions used in epidemiology

In this section I will review a number of concepts that need to be understood in order to properly understand my review of the evidence regarding talc powder and ovarian cancer. It is intended for readers who may not be expert in epidemiology. In this section I will not necessarily tie the concepts and definitions to the talc-ovarian cancer issue; that part will

be left for later. For now, I am simply introducing the non-epidemiologist reader to terminology and concepts with which she/he may not be very familiar.

Prevalence of disease. The prevalence of a disease refers to the proportion of a population who are living with the disease at any given point in time.

Incidence of disease. The incidence of a disease refers to the proportion of a population who are newly diagnosed with the disease during a certain period of time. The bridge between incidence rate and prevalence rate is the average duration of the disease, or how long people live with it before they are cured or pass away. In fact, while incidence and prevalence are foundational concepts in epidemiology, it is only incidence that figures prominently in the evaluation of carcinogenicity of talc.

Risk of disease. The risk of disease is a term that can refer to incidence or prevalence. The meaning should be clear from the context in which it is used. For studies of cancer, it almost always refers to incidence of disease. This is the way I will use the term in this report.

“Cause” of disease. A cause of a disease is any agent or characteristic (environmental, lifestyle or genetic) that increases the probability of getting the disease or it may simply advance or hasten the onset of the disease. It may act alone or it may act in concert with other factors over a lifetime to cause the disease. It may act immediately (e.g., cyanide as a cause of poisoning; lack of seat belt use as a cause of car accident mortality) or it may take many years for the effect to become manifest (e.g., lack of physical activity as a cause of obesity). There may be many different causes for the same disease. (See explanation of Multifactorial Etiology below.)

Risk factor. As defined in the Dictionary of Epidemiology (Last 2001), a risk factor is an aspect of personal behavior or life-style, an environmental exposure, or an inborn or inherited characteristic, that, on the basis of epidemiologic evidence, is known to be associated with a health-related condition. The term *risk factor* is used rather loosely and depending on the context it can refer to a factor that directly causes a disease or a factor that is a strong marker for the proximal cause of the disease. As it is often used, I will

mainly use the term “risk factor” as a synonym for the noun “cause” of the disease. (eg. “Smoking is a risk factor for lung cancer.”)

Association. As defined in the Dictionary of Epidemiology (Last 2001), association refers to the degree of statistical dependence between two or more events or variables. Events are said to be associated when they occur more frequently together than one would expect by chance. Association does not necessarily imply a causal relationship.

Risk among unexposed (R_u) refers to the risk of disease among persons who are not (or were not) exposed to the agent under investigation. In this case, it would refer to the risk of getting ovarian cancer among women who *have never* used talc in the perineal region.

Risk among exposed (R_e) refers to the risk of disease among persons who are (or were) exposed to the agent under investigation. In this case, it would refer to the risk of getting ovarian cancer among women who *have* used talc in the perineal region.

Relative Risk: $RR = R_e/R_u$ = Risk among exposed/Risk among unexposed

When $RR > 1.0$, it indicates that exposure to the agent increases the risk of developing the disease. When $RR < 1.0$, it indicates that exposure to the agent prevents the disease.

When $RR = 1.0$, it indicates that the exposure to the agent has no bearing on the risk of getting the disease.

95% Confidence interval (95% CI). This refers to the precision of an estimate of a parameter. When we estimate the 95% CI for the RR, we are approximately saying that we are 95% certain that the true parameter underlying the study is within these limits. (The true interpretation is more subtle.)

Statistical significance of an association: Statistical significance is a measure of the departure of a set of data from some null hypothesis. Most commonly in epidemiology, the null hypothesis would state that there is no association between a factor and a disease. The null hypothesis can be operationalized in different ways, such as that the $RR = 1.0$, or that there is no trend between the degree of exposure and the RR. Once a study is conducted, the results can be compared with the expected results based on the null hypothesis, and the discrepancy from the null hypothesis is measurable with probabilities. This is done

either by computing a p-value or a confidence interval. If the p-value is very small or the confidence interval does not include the null value, then we say that an observed association between the putative risk factor and the disease is unlikely to be due to chance alone.

It is important to note that while statistical significance is a tool for assessing whether an observed association is attributable to chance alone, it is not a very effective tool for establishing the absence of an association. That is, the absence of statistical significance is not tantamount to proof of the absence of an association. The absence of statistical significance can be due to the true absence of an association, but it can also be due to the study not having sufficient statistical power or to bias or confounding in the research methods. Furthermore, it should be noted that the conventional dichotomization of results as “statistically significant” or not, based on a particular cutpoint on the p-value scale (eg. $p = 0.05$), is a gross simplification. The compatibility of the data with the null hypothesis of no association is in truth on a continuous scale and the dichotomization is arbitrary and potentially misleading, especially when the observed p-value is close to the arbitrary cutpoint.

In practice, epidemiologists have been moving away from using and reporting p-values and statistical significance, as it has become clear that the main contribution of an individual study is to provide an estimate of the relative risk and its range of plausible values, embodied in a confidence interval.

Cohort studies and case-control studies: Epidemiologic research projects can take many different forms. The two most common types of analytic epidemiologic studies are cohort studies and case-control studies. (Rothman, Greenland, & Lash 2008)

In a cohort study, it is typical to enrol a large number of subjects, determine which ones are or have been exposed to the factor of interest (e.g., talc) and follow them for some period of time to evaluate whether those who were exposed subsequently experienced different disease rates from those who were not exposed.

In a case-control study, by contrast, we start with people who have the disease under study (e.g. ovarian cancer) and a set of controls who do not have the disease, and we collect data

to determine whether the cases and the controls had different histories of exposure to the factor under study (e.g. talc).

It may be said that a cohort study proceeds from the cause to the effect, whereas a case-control study starts from the effect and backtracks to the cause. There are many variants on these basic designs. These descriptions of these types of study are somewhat simplified.

It is sometimes claimed that a prospective cohort design produces more valid and reliable RR estimates than a case-control study. But this is incorrect as a generalization. The validity and reliability are not determined by the overall architecture of the study, but rather by the specifics of the study, including how the study subjects were assembled, the nature of the variables under study (exposure, disease, confounders), exactly how the information was collected, the statistical power, and so on. There may be many reasons why a particular case-control study is more valid than a particular cohort study.

Relative Risk (RR) and Odds Ratio (OR). The cohort study design leads naturally to the estimation of risk of disease among exposed, and risk of disease among unexposed, and then to the ratio of those two, which is the RR. In case-control studies, because of the way the study samples are selected, it is impossible to estimate the risk of disease or the ratio of the two risks, R_e/R_u . However, under certain conditions which are well met in studies of cancer, it is possible to estimate an approximation of the RR. This is called the odds ratio, referred to as OR. In the rest of this report, I will consider evidence obtained from both cohort studies and case-control studies, and I will refer to the findings of these studies as RRs, even if technically speaking, the results from case-control studies are ORs.

Bias, confounding, effect modification. The aim in an epidemiologic investigation of a putative risk factor is to derive an accurate estimate of the RR between exposure to the agent and the disease at issue. Because the investigator does not control the conditions in which people live and are exposed to different agents and their willingness to participate in research, there are many potential sources of distortion in epidemiologic research. While there are many sources of distortion, they can be bundled into a few large families of sources of distortion.

Bias refers to a systematic distortion in study findings, resulting from the way the study was designed or the way the data are collected. Specific examples of types of bias will be discussed below as they pertain to talc and ovarian cancer.

Confounding is sometimes considered to be a type of bias, and sometimes it is considered a type of distortion on its own. This is merely a semantic distinction. Confounding refers to the situation where the association under study between factor F and disease D is distorted because there is a third factor X which happens to be correlated with F and which is a cause of disease D. For instance if we want to study the association between occupational exposure to talc in mines (factor F) and lung cancer (disease D), we need to be mindful of whether cigarette smoking (factor X) is more common in talc miners than in the rest of the population. Confounding differs from other types of bias in that it depends on relationships among different variables in the population, rather than characteristics of the study design and data collection.

Effect modification refers to the phenomenon whereby a given factor has a different effect in one sub-population than in another. If we study the association between that factor and the disease in the entire population without distinguishing the two sub-populations, we might end up with an estimate of the association that does not convey accurately the association in either sub-population. For instance, if it were the case that a certain genetic characteristic G increases the risk of pre-menopausal ovarian cancer but has no impact on post-menopausal ovarian cancer, then a study of the association between G and ovarian cancer that does not discriminate by menopausal status, would find an RR result somewhere between the null value among post-menopausal women and the true RR value among pre-menopausal women. Depending on the proportions of pre- and post-menopausal women in the sample, the overall RR might be so close to the null, that we might erroneously conclude that there is no association at all. In this example, it might actually be quite simple to detect the effect modification, since age is always recorded and menopausal status is usually recorded and investigators are sensitized to the possible effect modification of female cancers by hormonal status. Other potential effect modifiers may not be so easily available and they might not be on the radar screens of investigators. Effect modification can in some unusual circumstances completely wipe out a true causal

association (as when the agent causes cancer in some people but prevents cancer in others!). But generally, if there is a causal effect of the agent in one stratum of the population and no association in another stratum, and if we fail to stratify the population according to the effect modifier, it will have the effect of producing an overall RR that is lower than it truly is in the sensitive stratum and higher than it truly is in the insensitive stratum.

Effect modification is closely related to and sometimes synonymous with interaction or synergism.

Publication bias refers to the tendency for some evidence never to “see the light of day”. Namely, when results are “negative” or “null”, it may be that investigators never bother to submit them for publication, or alternatively that editors refuse to publish them. This happens, most likely, when the hypothesis under study is not particularly topical or controversial, and when the study is small.

In this section I have briefly outlined some potential sources of distortion of a typical epidemiologic study. I have done this in a high-level generic way. Below, after presenting results of my review of pertinent literature on powders and ovarian cancer I will return to commenting on the possible impact of such distortions in this body of literature.

Exposure variable and exposure metric

An **exposure variable** can be anything that can influence the occurrence or outcome of disease. The term is used for such disparate entities as external components of what we eat, drink, breathe, hear or see and microbiological organisms, chemicals or forms of radiation.

Depending on the nature of the variable, information on an exposure variable can often be ascertained from epidemiologic study participants by questioning them. This is the case for variables like cigarette smoking or use of talc powders. For some variables, like exposure to a virus or to specific air pollutants or occupational chemicals, it is usually necessary to invoke more intensive data collection methods to ascertain exposure.

An ***exposure metric*** signifies a way of defining a variable for statistical analysis. The simplest metric is a binary variable: exposed or unexposed. For most exposure variables, like exposure to talc powder, there can be a very wide range of degree of exposure. And it is pertinent to create more nuanced exposure metrics that take into account the degree of exposure that different people have experienced, metrics such as duration of exposure, intensity or frequency of exposure and even cumulative measures of exposure over long periods of time.

Measurement error. Whenever we are measuring a variable in an epidemiologic study, be it smoking, or weight, or socio-economic status, or blood pressure, or any other variable, it is virtually inevitable that there will be some degree of error in the measurement. There are ways of collecting data that make them more or less likely to involve error, but it is almost impossible to ensure that variables are measured with perfect validity and precision. Even such a variable as the diagnosis of ovarian cancer is subject to differences of opinion among pathologists and oncologists and the presence or absence and the histologic type of tumour is not a guaranteed 100% perfect diagnosis. The ascertainment of the lifetime history of talc exposure by means of an interview with a woman in middle age or later in life is certainly susceptible to the caprices of memory and the way the questions are formulated may influence the validity of respondents' reports of lifetime exposure patterns. It is likely that habits that were performed regularly are more reliably recalled than activities that were sporadic or that only occurred many decades earlier. Similar issues arise for all other variables collected in such studies. We refer to measurement error as random (or non-differential) if the degree of measurement error does not differ between cases and controls in case-control studies or between exposed and unexposed in cohort studies. As a general rule of thumb, it can be asserted that random (or non-differential) measurement error has a predictable distorting effect on the RR. Namely, while there are some rather obscure exceptions, non-differential measurement error tends to attenuate the RR towards the null value of 1.0, and the more measurement error, the greater the attenuation. A full explanation for why this is so is quite technical and can be found in advanced epidemiology textbooks, such as Rothman, Greenland and Lash 2008. A very simple explanation is that the presence of measurement error in assigning exposed vs

unexposed status leads to dilution of both the exposed group and the unexposed group. That is, the ostensible exposed group (i.e. the folks who will be labelled as exposed based on the study data collection) will contain some folks who are truly unexposed and the ostensible unexposed group will contain some folks who are truly exposed. If there really is a difference in risk between the true exposed group and the true unexposed group, this difference will be watered down by the inadvertent inclusion in each group of folks who are really in the opposite group. An analogy is the cross-contamination of two cans of paint. Suppose we have a can of pure white paint and a can of pure red paint. Suppose we have a way of quantifying the difference in color tone between the two paints. Then suppose we take some spoonfuls from the red can and pour them into the white can, and likewise take a few spoonfuls of the white paint and pour them into the red can. Now the color contrast between the two cans has been attenuated. The color contrast in this example is like the relative risk in an epidemiological study which has been attenuated because the exposed and unexposed groups have been cross-contaminated.

Dose-response. It is important not only to assess whether there is an association between a variable and a disease when the variable is defined in a binary (exposed vs unexposed) way, but also when the variable is defined in a quantitative or semi-quantitative way. When we analyse the risk as a function of the degree or duration or intensity of exposure, we refer to this as a dose-response (or exposure-response) analysis. The example of the smoking and lung cancer is instructive about the value of different metrics, though it cannot be assumed that all risk factors act the same way. Studies using the binary metric for smoking (smoker/non-smoker) have been very consistent and persuasive in demonstrating an association between smoking and lung cancer. Further, when data are collected and analysed regarding the degree of smoking, it becomes clear that there is a monotonic dose-response relationship. That is, the more smoking, the higher the risk. And the quantitative metric that manifests the strongest association with lung cancer is the cumulative amount smoked over the lifetime. This is perfectly logical. Since the cumulative exposure metric embodies information on duration and on intensity, it can hardly be less predictive of risk than either of the dimensions alone.

We cannot assume that there is a universal form of a dose-response relationship for every true causal relationship. Most commonly, in toxicology and epidemiology, the relationship between exposure and risk is monotonic; that is, as one increases, so does the other. This can include linear relationships (i.e. where a straight line on a graph describes the relationship) or exponential or many other curvilinear forms. It is also possible that there may be a threshold effect (the risk only becomes apparent after a certain level of effective exposure) or some other non-standard relationship.

Both the qualitative metrics (ever/never) and quantitative metrics (a lot of use compared with a little use) are valid and useful metrics.

Sample size refers to the number of participants in the study. As a generalization, large studies produce more statistically stable and precise estimates than small studies. In fact the stability of estimates or precision of estimates is not a simple function of the number of participants, or subjects, in a study. The precision of estimates depends, among other things, on the type of epidemiologic design.

In a case-control study the main determinants are the numbers of cases and controls and the prevalence of exposure in the two groups; in a cohort study the main determinants are the numbers of participants, prevalence of exposure, and the incidence of the disease of interest over the period of follow-up in the exposed and unexposed groups.

There is sometimes confusion about the notion of sample size when we compare cohort studies with case-control studies. The operational aspect of an epidemiologic study of cancer that most influences the precision of an estimate of RR is not the total number of participants; rather, it is the smaller number between the number of exposed cases of disease and the number of unexposed cases. In a typical prospective cohort study, one might need to enroll 100,000 participants in order to end up with a certain number of cases (say, 500 cases) of the disease of interest (e.g. ovarian cancer). In a case-control design we might only need to enroll around 500 cases and 1500 controls to achieve the same statistical power as would be achieved by a cohort study of 100,000. The formal justification for this assertion is quite mathematical, and has to do with the fact that a sample of a population can give very accurate estimates of the characteristics of an entire

population. Thus, the simple comparison of 100,000 participants in a cohort study and 2,000 participants in a case-control study is in no way a valid marker for the relative statistical power of the two hypothetical studies. There are admittedly other advantages and disadvantages of the cohort vs the case-control design, and reviewers should consider the various aspects before deciding on the relative weight to give to the results of the different studies. But it is definitely not appropriate to merely compare the numbers of participants as an indicator of study validity.

While precision is based on multiple factors and different ones in case-control and cohort studies, there is a parameter which embodies the different factors quite well, and which is common to both case-control and cohort studies, namely, the number of exposed cases. For this reason, in laying out the various study results below, in addition to the relative risk estimates and their confidence intervals, I will show the numbers of exposed cases.

While it may affect the precision of estimates of RR, the size of the study does not in itself systematically affect the estimates of RR. That is, it is not the case that small studies produce systematically exaggerated RR estimates or systematically low RR estimates. However small studies can produce more wildly divergent RR estimates than large ones, in either direction, towards the null or away from the null.

Meta-analysis and pooled analysis: There are two distinct ways that evidence from multiple studies can be combined to derive a new overall statistical summary or synthesis of those studies, a meta-analysis and a pooled analysis. A meta-analysis uses the published results from each study and averages those results using some optimal weighting procedures. In order to implement a meta-analysis it is necessary to find all relevant studies on a topic that have published results in a fairly standardized way. The statistical algorithms typically used to average the results from different studies also provide statistics that evaluate how heterogeneous are the results from the different studies. The interpretation of such heterogeneity statistics is not straightforward. If the results from different studies are homogeneous, it adds to the confidence in the meta-estimate. If they are heterogeneous, it may indicate that the association is really different in different populations, or that there are some methodological characteristics of the different studies

that have influenced the results in different ways. Unless a significant methodological flaw can be identified that has caused the heterogeneity, the best overall estimate remains the meta-estimate.

A pooled analysis is one in which the investigator gets access not only to the published results from different studies, but rather to the individual data of every person in the studies. The latter is harder to achieve because it requires high buy-in and input from the investigators of the original studies; a meta-analysis is much easier to organise. Because a pooled analysis allows for standardization in the definition of variables and statistical models, it can be a more powerful means of summarizing data than the original studies themselves.

Multifactorial etiology of disease. Chronic diseases such as cancer are multifactorial in two distinct ways. On the one hand, each case of disease results from the unfortunate conjuncture of a combination of factors (these might include for example, genetic predisposition, diet, environmental pollutant, occupational exposure, medical intervention, viral infection, lifestyle habits, etc.) which combine over a lifetime to initiate and promote development of the disease. In this sense, each of the factors that are part of the combination for that person was a necessary contributor to the disease process, although it was not sufficient on its own to provoke the disease. Despite the fact that none of the factors were sufficient to produce the disease on their own, each of the contributory factors may be considered to be a cause of the disease. The disease would not have arisen if any of the contributory factors had been absent. This is one meaning of the multifactorial etiology of disease.

The second meaning is that the combination of factors that induce cancer in one person may not be the same as the combination that induces cancer in another person. Indeed, at the population level, there may be many combinations of causal factors for the same disease. Some factors may be common to different combinations. For example, it may be that in one case of lung cancer, the combination of factors included genetics, exposure to air pollution, exposure to radon in the home, and smoking; while in another person, the

combination of factors included genetics, insufficient dietary consumption of anti-oxidants like carotene, exposure to asbestos, and smoking.

Some characteristics of carcinogens and epidemiologic research on cancer: The following characteristics of most known carcinogens provide a framework for some of the thinking behind the design and interpretation of epidemiologic studies of cancer.

- There is typically a long induction period between exposure to a carcinogen and appearance of the disease. Thus, if a study has not allowed for a sufficient passage of time between the exposure and the disease, the result may report that there is no risk, where in fact there is a risk, but insufficient time has elapsed to make the risk visible.
- There is variability in the carcinogenic potency of different carcinogenic agents; some induce much greater relative risks than others.
- For any given carcinogen, the degree of risk due to exposure generally increases as the exposure level increases, but the shape of the dose-response curve may differ from one carcinogen to another.
- Most known human carcinogens were first discovered as such either by means of astute observation of a clinician noticing a cluster of cases among people who shared a common characteristic (such as working in a particular workplace) or by means of epidemiological research. In most cases, there was no known mechanism to explain the association at the time. Where the mechanisms have been elucidated, they were usually discovered subsequent to the epidemiologic demonstration of a causal relationship. (Siemiatycki 2014)

4.2 *Bradford Hill “guidelines”*

Because of the complexities of epidemiologic research, there has been some concern with how epidemiologic evidence should be used to draw causal inferences. Various authors have written about the types of information that might be considered in assessing whether a body of evidence demonstrates a causal relationship. A set of guidelines, developed in the context of the Surgeon-General’s Report on Smoking and Health (1964) and authored by

Bradford Hill in 1965, has achieved a wide consensus in the epidemiologic community as a pedagogical guide. Hill himself referred to these guidelines as “aspects” or “features” or “characteristics” of an association, and warned against treating them as “hard-and-fast rules of evidence that must be obeyed”. (Hill, 1965) He deliberately avoided referring to them as “criteria.”

Since Hill wrote those thoughts at the beginning of the era of modern epidemiology, without the benefit of decades of practical experience in the way those thoughts were taken up, and how they applied to issues other than smoking and cancer, it is understandable that the practice of evaluation of causality has evolved. A first observation, often overlooked, is that Hill took as a starting point for his writings that chance had been considered as an explanation for the smoking-cancer association and determined to be unlikely. In the historic context of 1964-1965 and the debates around smoking and cancer, this was a reasonable assumption to make, but for any other putative associations, this must be considered. Over the years, respected authors have paraphrased and updated these aspects in various ways, and this will undoubtedly continue. For instance, leading textbooks of epidemiology as well as the Reference Guide on Epidemiology of the Manual on Scientific Evidence (2011) all have different formulations of Hill’s guidelines.

In the light of 50 years of practical experience after these guidelines were written, and based on my practical experience of evaluating causality in many forums and on many topics, I would paraphrase (and modernize) Hill’s guidelines as follows:

Strength of the association: This can be measured by different parameters, but for cancer studies it is usually measured by the magnitude of the relative risk or odds ratio.

Statistical significance of the association: While this guideline was not explicitly listed by Hill, it is nonetheless in practice an implicit and distinct consideration in assessing causality. If the estimated RR is quite high, indicating a strong association, but is based on a very small study with low precision, this might be solely due to statistical variability. (For instance, when we flip a balanced coin 10 times, we do not always end up with 5 heads and 5 tails. Sometimes, by chance, we may end up with 6 heads and 4 tails. Does this prove that the coin was not balanced?) Evaluating the role of statistical chance as a possible

explanation of the observed association is important. As explained above, the absence of statistical significance is not strong evidence of an absence of a real relationship.

Dose-response relation: If the relative risk increases when the exposure increases, it enhances the likelihood that the observed association is really causal. There are some counter-examples however where the effect is only observed after a threshold of exposure has been crossed. There are various ways to assess whether there is a dose-response relation. Hill pointed out that the main challenge is to establish reliable and measurable quantification of exposure. In studies of lifestyle habits like use of talcum powder products, the most common way is to estimate the RR in increasing categories of exposure metrics such as duration (years) of usage, or intensity of usage (frequency per day or per week or per month), or cumulative amount of usage (a combination of duration and frequency).

Absence of bias: There are many forms of bias that can infiltrate an epidemiologic study. It enhances the likelihood of a true causal association if we can confidently exclude all the plausible sources of bias explanations for the observed findings. This guideline can also be considered as a component of a guideline to consider other possible explanations for the association.

Temporality: It is clear that the exposure should precede the outcome (i.e. the disease). To ascertain whether the cancer was a result of the exposure or the exposure occurred after the cancer onset seems like a simple thing, but sometimes it can be difficult to ascertain with certainty.

Cessation of exposure: It would add to the credibility of the association if it had been demonstrated that subjects who cease exposure to the agent experience reduced risks of disease compared with those who continue to be exposed. In practice this is an extremely difficult characteristic to demonstrate, partly because of the difficulty or even ethical impossibility of changing people's habits for scientific experimentation purposes. But occasionally there may be a "natural experiment" wherein large numbers of people cease their exposure and the effects can subsequently be measured in an epidemiologic fashion.

Specificity of the association: It was believed that individual risk factors have specific pathological effects, and Hill posited that if we observe that a given agent is associated with

many different pathologies, it increases the likelihood that these are somehow spurious observations, resting on some type of bias in the studies of that agent. In reality, this Hill characteristic has fallen out of usage in the intervening years with the demonstration that some agents can indeed provoke multiple different pathologies. Examples include cigarette smoking, ionizing radiation and asbestos fibers.

Consistency of findings between studies (or replication of findings): Because epidemiologic research is susceptible to errors from random variability and from different kinds of study biases, before accepting the apparent association as a generalized phenomenon, it is important to see that similar results are replicated in different studies. When these different studies also encompass different study populations in different communities, it enhances the generalizability of the inferences. Generally speaking, the observation of consistent results in different studies adds to the credibility of an inference that there really is a causal relationship.

Coherence with other types of evidence: In the case of tobacco and cancer, it was seen that the historic trend in lung cancer mortality rates in the US and UK followed quite closely the national trends in consumption of tobacco, with a 20 year lag. This was interpreted by Hill as corroboration of the results observed in case-control and cohort studies. Epidemiologic evidence of coherence could conceivably take many forms, and the opportunity to assess coherence is something that is specific to the factor under investigation. Assessment of coherence with historic mortality trends would only be possible in the case of a factor whose exposure in the population changed quite dramatically over time in a way that can be documented, and for which the attributable fraction of the disease due to that factor is very high. This was the “perfect storm” of circumstances that allowed for an assessment of the tobacco-lung cancer association by means of time trend correlations.

Analogy: Hill reasoned that if a factor is somehow similar to another factor that has already been shown to be a risk factor for the disease, then it increases the plausibility of a similar impact due to that putative factor. This is such a vague guideline, with no clear implementation suggestions, that it is not often referred to and rarely implemented.

Biologic plausibility: This guideline can encompass many dimensions of information, including physiology (can the agent or its metabolites reach the organ?), animal carcinogenesis (does the agent produce tumours in experimental animals?), cell studies that reveal mechanistic data, and other biologic information on the toxicology of the agent.

Implementing Hill's guidelines: As Hill himself insisted, sophisticated users of these guidelines do not use them as a formal checklist. He summarized his views as follows:

« What I do not believe ... is that we can usefully lay down some hard-and-fast rules of evidence that must be obeyed before we accept cause and effect. None of my nine viewpoints can bring indisputable evidence for or against the cause-and-effect hypothesis and none can be required as a *sine qua non*. What they can do, with greater or less strength, is to help us to make up our minds on the fundamental question - is there any other way of explaining the set of facts before us, is there any other answer equally, or more, likely than cause and effect? »

The authors of the Reference Guide on Epidemiology of the Manual on Scientific Evidence (2011) clearly stated that Hill's guidelines are not formal criteria, but rather are more in the nature of a memory aid to help us review the evidence about any given causal association. They stated it this way: "There is no formula or algorithm that can be used to assess whether a causal inference is appropriate based on these guidelines."

I have served on many panels to review evidence of causality on one topic or another, including on several IARC Monograph panels that reviewed evidence of carcinogenicity. The IARC process, like the others I have participated in, does not use the Hill guidelines in any rigid formal way. The ideas embodied in Hill's guidelines permeate our thinking about how to evaluate causality, but the operationalization of these guidelines is specific to the problem and to the expert making these determinations. Thus any suggestion that Hill's "aspects" or "features" or "characteristics" of an association should be used as a formal checklist of criteria is simplistic and wrong. To do so would contradict the opinions of experienced epidemiologists, the Manual on Scientific Evidence, and Bradford Hill himself.

In this section, I have laid out and explained the Bradford Hill guidelines in a generic way. Below, in section 8, I will consider how these apply in the context of the talcum powder – ovarian cancer issue.

5. Epidemiologic evidence regarding talc and ovarian cancer

Following some reports in the early 1980's that raised questions about a possible link between use of cosmetic talc powder by women and the risk of ovarian cancer, there were several epidemiologic studies on the topic. By the early 2000's the issue was garnering some attention in the scientific community. The International Agency for Research on Cancer, the premier agency for evaluation of carcinogens, decided to conduct a review of the issue in 2006. Following that review, there have been further studies conducted on the topic.

In the context of a legal action, my mandate is to review all relevant scientific evidence available to date, in order to provide the court with my opinion regarding the link between talc powder exposure and ovarian cancer. The methodology I employed is the same one I have used in my career as an internationally recognized researcher.

5.1 IARC review and evaluation of talcum powder products

As mentioned above in Section 2, the International Agency for Research on Cancer (IARC) is the premier institution in the world for cancer epidemiology and for environment and cancer research. One of its mandates is the evaluation of the carcinogenicity of different agents with which humans come into contact, and this mandate is carried out by the Monograph Programme of IARC. This is achieved through a process that involves identifying chemical or physical agents for evaluation, convening specially selected international expert panels that are mandated to review all pertinent evidence on the topic and write a thorough review culminating in an evaluation of whether the agent(s) are human carcinogens.

In February 2006, there was such an IARC Monograph meeting to evaluate some agents, including talc. The IARC Working Group comprised 16 highly respected and recognized scientists from around the world; I was asked to Chair the Working Group. We reviewed all

the evidence that was available up to that point in time. This certainly included epidemiologic evidence, but it also included evidence from experimental toxicology, physiology, molecular biology and other domains. The IARC Monograph programme has a formal system for classifying agents. The Working Group must classify an agent into one of the following categories:

- 1 Carcinogen
- 2A Probable carcinogen
- 2B Possible carcinogen
- 3 Not classifiable
- 4 Not carcinogen

After reviewing the evidence, the panel concluded that talc was a “possible carcinogen”, based primarily on evidence regarding the association between dusting powders and ovarian cancer. Here is the definition of this category from the IARC Monograph:

“Group 2B: The agent is possibly carcinogenic to humans.

This category is used for agents for which there is *limited evidence of carcinogenicity* in humans and less than *sufficient evidence of carcinogenicity* in experimental animals.”

This 2B categorization was based on the panel’s decision that there was “limited evidence of carcinogenicity in humans”, which is in turn defined by IARC as follows:

“Limited evidence of carcinogenicity in humans: A positive association has been observed between exposure to the agent and cancer for which a causal interpretation is considered by the Working Group to be credible, but chance, bias or confounding could not be ruled out with reasonable confidence.”

Subsequent to the completion of the IARC Monograph on talc, a subgroup of the epidemiologists who were on the IARC Working Group, including myself, reviewed the evidence again, but with a view to producing a meta-analysis of the results from the most informative studies conducted to that time. This resulted in the paper by Langseth et al. (2008). This paper was not an IARC publication.

5.2 Information consulted for the present review

In preparation for formulating my current opinions on this topic I assessed, researched, reviewed and consulted a large number of documents, including, but not limited to: all original epidemiological studies published on this topic, all meta-analyses and opinion pieces, experimental toxicology, molecular biology, mechanistic studies, and the IARC Monograph on talc which reviewed all informative studies that had been published before 2006. I was given access to and also reviewed the various expert reports and depositions that have been submitted in various talc cases, either on behalf of the Plaintiff or Defendant, and various internal company documents obtained in discovery.

I systematically reviewed the lists of references of all relevant studies referenced in the IARC report as well as in various meta-analyses and in all recent articles on the topic to identify yet more relevant publications on talc and cancer.

Because some studies have been published in multiple papers and because some papers have included reports on multiple studies, there is not a one-to-one relationship between studies and published papers.

Additionally, I considered evidence regarding the toxicology of talc by reviewing the toxicology evaluation conducted by the IARC Working Group, the summary of talc's putative toxicology referenced in various scientific publications, and the expert reports of various scientific/medical experts in this case.

The central focus of my review is on the epidemiologic evidence.

A complete listing of the documents I consulted, as well as references cited explicitly in this report, is provided in the Bibliography. The Bibliography is in two Parts; Part A comprises all the publications and reports that can be found in publicly available scientific literature. Part B comprises company documents or documents from reports or testimonies of experts.

5.3 My methodology for this review

Table 1 lists the steps I undertook to accomplish my mandate.

5.3.1 Selecting studies for review

To aid in the present assessment of whether or not there is a causal relationship between talcum powder exposure and ovarian cancer, I carried out an up-to-date review of the scientific literature, primarily the epidemiologic literature, concerning the association between use of talc powder and risk of ovarian cancer. This involved meta-analyses to estimate the effect of having ever used perineal powdering, and an assessment of evidence regarding dose-response.

The first task was to find the relevant publications and to set out the distinct pieces of epidemiologic evidence, namely the results of different studies. Based on a number of reviews on the topic of talc and ovarian cancer, including the IARC report, I systematically went through the reference lists to identify all publications that seemed to contain results on the topic. I further conducted a Pubmed search and this did not produce any new informative publications that had not already been identified. In preparation of the meta-analysis, I eliminated from consideration papers that were outside the bounds of what a meta-analysis should contain (i.e. eliminate review articles, commentaries, meta-analyses, and articles that do not really pertain to the issue of perineal talc and ovarian cancer). From the 40 publications that remained, namely those that contained original results on the association between powdering and ovarian cancer, I extracted all results showing RRs between talc powdering and ovarian cancer, and I had these results put into a Filemaker database. This was a value-free exercise. I made no judgement at that stage about relevance or quality of the study or the published results. It was only an attempt to lay out in one “place” the whole of the evidence and to prepare for subsequent analyses. There were over 730 results in this database. On average each publication contained about 18 different RR results of various aspects of talc powder exposure and various types of ovarian cancer. Some contained fewer and some contained many more. (For instance, one study publication contained 180 results, with varying types of ovarian cancer and varying definitions of exposure to powdering.)

In deciding which results to include in a meta-analysis I had to respect the following principles:

- The results have to pertain to the issue of risk of ovarian cancer in relation to use of talc-based powders.
- Where there are sufficient numbers of results to support meta-analyses, there can be meta-analyses for different types of ovarian cancer, and for different routes of exposure to talc-powders.
- In each meta-analysis, each study should only provide one result, so as to avoid double-counting evidence.
- The decision about inclusion of a study should in no way be influenced by whether or not a particular study demonstrated high risks or low risks.

While these seem like simple principles to respect, there were complicating features of the scientific literature:

- Some studies were reported in multiple publications, sometimes the same study subjects were analysed and reported in different ways and sometimes different subsets of the study population were included in different publications. Sometimes the authors fail to clearly enunciate how the data used in one of their papers overlaps with data used in another of their papers from the same study.
- Different studies used different questions about powder use in their questionnaires, and sometimes the same study reported results by different ways of asking about or defining exposure.
- A given study may have presented one result or many results, each addressing a different definition of the talc exposure variable and different way of grouping the ovarian cancer cases.
- Different studies dealt differently with the histologic sub-types of ovarian cancer, sometimes grouping them all, or sometimes separating them, or sometimes reporting both grouped and separate results for different sub-types.

- Different studies used different metrics for analysing powder exposure and estimating its corresponding RR.
- Different studies dealt differently with the challenge of adjusting powder-related risks for possible confounding by other factors.

Decisions had to be made regarding which types of exposure to consider, which types of ovarian cancer to consider, which metrics of exposure to consider and which studies and publications to consider. It is necessary to be rigorous in making such decisions ahead of time, rather than “cherry-picking” results from different studies that appear to support one theory or another.

Appendix Table A1 provides a list of those 40 publicly available publications that have included some original results that might pertain to the association between powdering and ovarian cancer. **Appendix Table A1** shows which publications were included and which papers were excluded from my meta-analyses. For each of the 14 excluded papers, the table also shows the reason. Some papers were excluded because the results did not pertain to ovarian cancer and powdering in the perineal region. Some papers were excluded because the results presented therein were subsumed by a subsequent publication by the same research team or as part of a pooled analysis of multiple studies. Notwithstanding my intention to identify all unique studies and to extract a best “bottom line” result from each study, the nature of the studies and how they were analysed and reported led to many judgement calls. It must be acknowledged that there can be differences of opinion among equally competent and equally well-motivated scientists in how to choose among the different publications and the different results within publications.

Fortuitously, and unbeknownst to me at the time, two other sets of investigators (Berge et al 2018; Penninkilampi et al 2018) carried out separate meta-analyses on this topic at about the same time as I was carrying out mine, and this gives an opportunity to do some cross-comparison of different reviews and meta-analyses. I will comment on these after presenting the results of my meta-analyses.

5.3.2 What were women exposed to in body powders?

Talc has been the main ingredient of body powders used by women over the past century. “Talc particles are normally plate-like. When viewed under the microscope in bulk samples or on air filters, they may appear to be fibers ... Talc may also form as true mineral fibers that are asbestiform; asbestiform describes the pattern of growth of a mineral that is referred to as a ‘habit’. Asbestiform talc fibers are very long and thin.”(IARC 2010) The structure of platy talc is characterized by a hexagonal sheet arrangement of silicon-oxygen tetrahedral groups in a common plane which creates a double-sheeted structure. These sheets are easily separated which accounts for the “silky” or “smooth” feel of talcum powder products (IARC, 2010). As a mined mineral, the precise chemical and physical characteristics of talc are in part determined by the particular geological formations from which it is extracted. The local conditions can also produce “impurities” in the extracted talc including asbestos, quartz and various metals. It is claimed that cosmetic talcum powder products normally contain >98% talc (Zazenski *et al.*, 1995) but the purity may have been lower in the past. (IARC 2010) When I refer to talc or talcum powder products in this report, I am referring to commercially available talcum powder products and all constituent elements contained in those products.

Asbestos is a commercial term that comprises six minerals that occur in the asbestiform habit: actinolite, anthophyllite, chrysotile, grunerite, riebeckite and tremolite. Similarly to talc, these six minerals can occur in a non-asbestiform habit. Some types of asbestos are found in the same geological formations as talc.(IARC 2010)

By the 1970’s it was reported that asbestos fibers were found in commercial talcum powder (Cralley 1968; Rohl 1976), though there was some doubt expressed regarding the quantification of the exposure and the ability to discriminate between asbestiform and non-asbestiform talc. (Krause 1977; IARC 2010) The talc industry was constrained to remove asbestos from talcum powder products. Representatives of the industry have claimed that talcum powders were free of asbestos fibers since the 1980’s (Hopkins 2018; Pier 2018), but this assertion has increasingly come under doubt as number of labs have

reported finding asbestos fibers in talcum powder products. (Blount 1991; Paoletti 1984; Gordon 2014; Longo et al 2017; Longo et al 2018; Blount deposition 2018; Pier deposition 2018) These various studies that have reported finding asbestos in historic talcum powder samples have been challenged by other reports that failed to find meaningful amounts of asbestos in historic talcum powder samples. (CIR 2013; Anderson 2017) These various findings and opinions are somewhat complicated by the fact that both talc and asbestos have varied chemical and physical characteristics and various methods can be used to measure them.

What is clear is that asbestos, and all forms thereof, has been evaluated to be carcinogenic. It has long been recognized that inhalation of asbestos carries with it a risk of lung cancer and of mesothelioma, a cancer of the lining of the lungs, as well as larynx cancer. What has only recently been recognized is that women who are exposed to asbestos experience an excess risk of ovarian cancer. (Straif 2009; IARC 2012) This conclusion was based on five studies; a subsequent meta-analysis reported that the RR of ovarian cancer among asbestos-exposed women was a highly statistically significant 1.77 (1.37-2.28). (Camargo 2011) The route of exposure that generates risk of ovarian cancer among women exposed to asbestos is not clear, but inhalation and migration of asbestos particles to the ovaries has been proposed as a credible biologically plausible mechanism. (Miserocchi 2008)

Among the metals detected in talcum powder products are some which are recognized carcinogens, namely nickel and chromium. It is not known how widespread was the "contamination" of talcum powder products by these metals and how high were the concentrations in the entire commercial production of talcum powder products of the past several decades, and how these exposures measure up to exposures that may cause cancer. However, evidence that asbestos and some other known carcinogens have been detected in some commercial cosmetic talcum powder products and credible mechanisms that such particles can translocate to the ovaries is an important consideration in deriving an opinion on biological plausibility, and I will consider it below in my section on biological plausibility of a causal link between talcum powder products and ovarian cancer.

Alternative formulations of baby powder include cornstarch formulations, which have become available in the past 30 years. It was possible for women to purchase and use cornstarch products or talcum powder products. Most epidemiological studies have not tried to ascertain whether the women in their studies used talc-based or cornstarch-based formulations and many women may have been unaware of the composition of the powders they used at different times. It is impossible to ascertain with certainty from most of the publications whether the reported epidemiologic results pertain to talc-based powders or cornstarch-based powders or both. Those studies that did report results for cornstarch had few women self-reporting use of cornstarch and the risk estimates were rather imprecise and unstable. For those studies that did report separately the findings for talc-based and cornstarch-based formulations, I used the results for talc-based powders. For those that did not make such distinction, I used the results combining all types of powders as reported. If it turns out that there is an increased risk associated with talc but not with cornstarch, the inability to discriminate the two in statistical analyses would have the effect of diluting the estimates of risk due to talc. That is, the RR estimates would be attenuated.

5.3.3 Routes of exposure

Some studies reported results based on particular ways of using the powders, such as on feet or perineal use or use after bathing or use on sanitary napkins or use on diaphragms or use by male partners, and so on. And many studies just reported results for all routes of perineal exposure combined. For my Main analyses, I aimed to use the reported results pertaining to all types of perineal use combined. Where the results were reported for individual routes of exposure rather than all perineal use combined, I identified the one that came closest to powdering in the perineal area from all routes.

The number of studies providing results pertaining to any of those specific routes of exposure was much less than the number providing evidence for all routes combined and insufficient to provide reliable meta-analysis results for route-specific estimates of RR. Among the route-specific reports, the one that had most often reported RR results was exposure from dusting of sanitary napkins. I will conduct a separate meta-analysis regarding the risk of ovarian cancer in relation to use of powder on sanitary napkins.

5.3.4 Questionnaire items on use of talc powders

In the case of exposure to cosmetic talc powder, the most common and realistic way of ascertaining exposure has been to question women. But there are many ways this can be done, and indeed many types of questionnaires have been used. A very simple format that has been used is to ask a question such as “have you ever used powders in your genital area?” But, the validity of the response would be enhanced if the question is framed in a more specific manner, so long as the respondent can be expected to know the answer to the more specific question. One possibility would be: “have you ever used powders that contained talc on your genital area more than once a week for at least 6 months of your life? This would include powdering your genital area directly or powdering your underwear or powdering your diaphragm or powdering your sanitary napkin.” There are scores of ways such questions can be asked, and there has been variability in the methods of questioning among the different studies of powder use and ovarian cancer. In most studies, the questionnaire question about Ever Use was actually about Ever Regular Use, not Ever Occasional Use.

Among women who used powders, there can be an enormous range of usage from a few occasions in a lifetime to profuse daily usage. Among the many dimensions of talcum powder exposure that might influence the risk of cancer are the following: manner in which the talc was applied, age at which exposure began; if it ended, age at which it ended and years since it ended, frequency of use per day, week or per month, multiple applications including to genitals, undergarments, sanitary napkins, etc., and whether and how that varied at different ages. Some studies have used a single simple question, while others have used scores of questions to get at the lifetime history and many facets of powder use.

While I believe there are quality differences between the different studies in the way talc powder data have been collected, I have refrained from imposing my judgement about the quality of the questionnaire data on the selection of studies to include in meta-analyses.

5.3.5 Metrics of exposure

I used the reported results for the binary metric Ever Regular Use vs Never Regular Use, given the limitations of the available data, and using the investigators' decisions about how best to measure this. While this may seem like a simple tactic to implement, some studies were reported in such a way that in fact I had to make "judgement calls" about which of the reported results came closest to the desired metric.

For "dose-response" assessment, I used three pertinent metrics of exposure: duration (years), intensity/frequency (uses per day, week or per month), and cumulative number of applications, measured sometimes in absolute numbers or sometimes in quantiles. Of the three, the most meaningful is the cumulative number of applications.

6. My meta-analyses regarding talcum powder products and ovarian cancer: data included and results

6.1 Features of the studies

Following the exclusions indicated in Appendix Table A1, **Appendix Table A2** shows the studies that ended up being included in one or more of my meta-analyses, and brief descriptions of administrative and contextual features of each study. **Appendix Table A3** shows, for the same studies, some information about the talcum powder exposure variable and the covariates used by the authors in their control for confounding.

Appendix Table A2 shows that most studies were conducted in the USA. All but three were case-control studies and of the case-control studies, all but four used some type of population control series. Most studies had fieldwork data collection in the 1970's and 1980's; only a few studies started data collection after 2000. Table 3 shows for each study what exposure variable I was able to use to approach the notion of Ever exposed regularly to talc powder in the perineal region. Different studies had different questions in the questionnaire and different studies reported different variables. The questionnaires usually elicited lifetime use that was more than very sporadic, with terms like "regular" use. Only the Gonzalez 2016 study failed to ask about lifetime exposure before the interview; they asked about usage only in the preceding 12 months. The Gates 2010 study

asked about use of talc up to 1982 but not afterwards. Some studies asked separately about different routes of exposure and then rolled them together in statistical analyses, while some rolled all routes of exposure together in their questioning. The term that I show in Appendix Table A3 is the term that the authors reported in their publication of results; it is sometimes rather cryptic. Appendix Table A3 also shows which variables that the authors reported having used as adjustment variables. Sometimes these are variables that were explicitly included in final statistical models, and sometimes these were dealt with in a more indirect way such as a staged analysis in which a screening is conducted using a change-in-estimate procedure.

All meta-analyses were conducted using the well-known package Comprehensive Meta-Analysis Version 3. (Borenstein, M., Hedges, L., Higgins, J., & Rothstein, H. Biostat, Englewood, NJ 2013; <https://www.meta-analysis.com/index.php?cart=BFZW2135997>)

6.2 Association between binary variable talc powdering and all types of ovarian cancer combined – data and results

6.2.1 Individual studies and results on binary exposure variable

Table 2 shows RR results, as well as the corresponding 95% confidence intervals, for each informative study included in the Main meta-analysis or in any sensitivity analyses. (I will explain this distinction below.) As I explained in Section 4.1, the single number which reflects quite well the statistical strength of a study, be it case-control or cohort, is the number of exposed cases, and I have included this parameter in Table 2. Table 2 shows the RR reported in each study by Ever (regular) use of powder in the perineal region (all routes of perineal exposure including direct powdering on genital area, on sanitary napkins, on underwear and on diaphragms). The table shows results for all types of ovarian cancer combined.

Before conducting any meta-analyses, we can peruse the results in Table 2 to observe certain patterns.

Of the 33 RR results shown in Table 2, two are below 1.0, one equals 1.0, and 30 are greater than 1.0. On the null hypothesis that there is no true association between powdering with

talc and ovarian cancer, we would expect as many of the RR estimates to be above 1.0 as to be below 1.0. The observed distribution (2 below and 30 above) is clearly and strongly in defiance of the null hypothesis. Further if we rank the RR estimates from lowest to highest, the median value, the one in the middle, would be 1.34.

This informal analysis does not take into account that the 33 estimates in Table 2 are not strictly independent of each other. There are various ways to carve out independent sets of results from this list of results in Table 2, and the meta-analyses will be designed to do that. But no matter how the studies are configured, it will be found that one or two of the RR estimates are below 1.0 and somewhere between 20 and 26 are above 1.0. Such an imbalance cannot be due to chance.

6.2.2 Strategy for Main analysis and sensitivity analyses

An investigator typically has in mind a strategy for analysing and presenting the results. There may be some judgement or assumptions involved in deciding on the strategy. The investigator may wish to see how the results would be affected if other judgements or assumptions were made. In other words, how robust are the results to alternative judgements and assumptions. Such alternative analyses are referred to as *sensitivity analyses*.

There were several dilemmas in selection of studies and results to include in the meta-analysis. I made decisions in each case that I believe provides the best basis for a meta-analysis. But in deference to other possible decisions that might have been made, I conducted some sensitivity analyses as well. I list what the dilemmas were and which options were selected for Main analyses and for sensitivity analyses.

a. Terry 2013 and Wu 2015. The Terry 2013 paper brought together data from 8 different research teams. Some of those teams had previously published their results on talc and ovarian cancer and some had not. Normally, a pooled analysis would take precedence over the individual component studies. In this case, however, there were complicating factors. The Los Angeles component study of Terry 2013 (Wu, Pike and colleagues) was conducted in stages and the Terry 2013 pooled analysis only had access to the early stage. Subsequently, Wu and colleagues carried on with their data collection, and published a

more complete set of results from their study in Wu 2015. The Terry 2013 paper contained 208 exposed cases from the Los Angeles study, whereas the Wu 2015 paper contained 701 exposed cases. In the entire Terry 2013 paper there were 2600 exposed cases. Ideally, we would wish to exclude from the 2600 exposed cases in the Terry 2013 paper, the 208 exposed cases that came from the early Los Angeles data. But that information was not available. Thus there is an 8% overlap between the exposed cases in the Terry 2013 paper and those in the Wu 2015 paper.

I adopted the following strategy. For the Main analysis, I included both Terry 2013 and Wu 2015. The 8% overlap of exposed cases is unfortunate but I believe its impact would be trivial, and in any case we will have some empirical evidence of its impact from a sensitivity analysis.

I conducted sensitivity analyses using a different strategy. The Terry 2013 paper contained a table in which the individual results of the 8 component studies were reported. I used the results as reported there for 6 of the 8 component studies, for which the Terry paper contained the latest results. For the Los Angeles study I used the result reported in Wu 2015 which was much more complete than the L.A. study result in Terry 2013. The eighth study was the study of Cramer that was one of the components of Terry 2013 but that was also reported subsequently in Cramer 2016. It is not clear whether the Cramer 2016 paper contains more up to date data than the corresponding component in Terry 2013, but it possibly does.

To summarize, the Main analysis contained pooled result from Terry 2013 and the result from Wu 2015. There were sensitivity analyses that dropped the pooled result from Terry 2013, but included the (apparent) latest published result for each of the 8 components.

b. Nurses Health Study. This cohort study was initiated in 1976 and was not a study of talcum powder products and ovarian cancer. The study involved a wide-ranging annual questionnaire which inquired about many health related issues. In 1982 there was a very succinct question about use of body powders. The cohort has been followed-up to ascertain the occurrence of cancers (or other diseases). There was a publication that contained results on talc and ovarian cancer from this study in 2000 (Gertig 2000); later, after more

years of follow-up there were two further papers presenting results on talc and ovarian cancer (Gates 2008 and Gates 2010). Clearly the Gertig result did not belong in my meta-analysis, since it was subsumed by subsequent analyses, but the choice between the Gates 2008 and Gates 2010 was not so obvious. Gates 2008 was based on a nested analysis of a subset of the cohort that probably entailed better control for confounding. Gates 2010 was based on the entire cohort and thus on a much larger sample size. The two RR estimates from the Gates papers are quite different from one another (RR=1.24 in Gates 2008 and RR=1.06 in Gates 2010). It is not clear whether the difference in results is due to the different design and analytic procedures used in the two papers. The authors did not comment on the inconsistent results.

My Main analysis included Gates 2010 but not Gates 2008. Some sensitivity analyses contained Gates 2008, but not Gates 2010.

It should be noted that whereas I did not use the Gertig paper results in the meta-analysis of Ever / Never Use of talcum powder products, I did use some dose-response results from Gertig because subsequent publications from the Nurses' Health Study did not present such results.

c. Schildkraut (2016). This was a case-control study of ovarian cancer among African American women. The fieldwork and interviewing was carried out from 2010 to 2015. The authors speculated that publicity surrounding two class action lawsuits on talc and ovarian cancer in 2014 may have subsequently induced bias in the validity of reporting of talc exposure. Consequently, in their analysis and report, they presented two sets of results, one for all women in the study, and another for those interviewed before 2014. It is impossible for me to evaluate the validity of the speculation, as it was for the authors. Consequently I will use the results from the entire sample and those from the pre-2014 sample. I refer to the entire Schildkraut study result as Schildkraut A and the pre-publicity result as Schildkraut B.

The Main analysis contained Schildkraut A. Some sensitivity analyses contained Schildkraut B.

d. Shushan (1996). This ovarian cancer case-control study, conducted in Israel, reported results on talc and ovarian cancer, but the report was quite cryptic regarding the data collection and the talc exposure variable.

The Main analysis excluded Shushan 1996. Some sensitivity analyses included Shushan 1996.

6.2.3 Results of meta-analyses on binary exposure variable for all ovarian cancers

Figure 1 shows the printout from the Comprehensive Meta-analysis (CMA) package for the Main meta-analysis for the association between ever regular use of talc powder in the genital area and all types of ovarian cancer combined. 21 RR results were used in the Main meta-analysis, but the Terry 2013 study represents 8 different study teams and 10 distinct studies. In the forest plot, I have ordered the studies in increasing magnitude of the RR estimate. It can be seen that only one study produced an RR estimate to the left of the null value of 1.0, while 19 studies produced an RR estimate to the right of the null value of 1.0.

The meta-estimate of RR is 1.28 with a 95% confidence limit from 1.19 to 1.38. The p-value is too small to register in 2 digits. This is a very highly statistically significant result. The probability of this result being attributable to chance is vanishingly small.

The 21 RR estimates in this Main meta-analysis had a fairly low p-value for heterogeneity, 0.07, but it was not statistically significant. This means that there was considerable variation in RR results across the studies, but this might have been due to chance. That there is significant variation in RR estimates is not surprising. The different studies were conducted among different populations, using different methodologies. It would be surprising if there was no variation. It is nevertheless true that in the current state of knowledge the best estimate of RR is the meta-estimate of 1.28.

Table 3 shows the results of the Main meta-analysis again and contrasts it with the results of seven sensitivity analyses that embody alternative plausible strategies for selecting studies and selecting results within studies. These alternative strategies had almost no effect. The meta-estimates of RR varied in a narrow range from 1.26 to 1.30. Even the lowest of these would lead to the conclusion that there is a highly significant association.

It can be affirmed, quite confidently, that the apparent overall elevated risk for women who had ever used such powders is not an artefact of chance variation. This conclusion is not new. It has been stated by the authors of previous meta-analyses. However, I believe this conclusion is based on the most current and reliable data now available.

From a statistical point of view, each of the studies listed in Table 2, except for one or two outliers, shows a 95% confidence interval that overlaps substantially with the confidence interval of the meta-RR estimate (1.19 – 1.38). Further, the majority of the study-specific confidence intervals (including 2 of the 3 cohort studies) include the overall meta RR of 1.28. This shows that there are few if any studies that are not compatible with the overall RR estimate.

6.2.4 Other contemporaneous meta-analyses on binary exposure variable for all ovarian cancers

I started to conduct my meta-analyses in 2015 and revised it in 2018. Towards the end of my analyses, I discovered that two other teams of researchers were carrying out meta-analyses on the same topic at almost the same time. The simultaneous and independent conduct of these three meta-analyses provides a unique opportunity to cross-validate the methodologies and results. (I knew nothing about the two others and I assume they did not know either about mine or the other meta-analysis.) It is sometimes portrayed that meta-analysis is a fairly automated procedure which should produce identical results irrespective of who carries it out. This is far from true.

Even before the statistical part of the meta-analysis is conducted, the author of a meta-analysis has to assemble all of the relevant data. That usually consists of two steps: identifying all informative studies on the topic and identifying the relevant result from each study to include in the meta-analysis. There are many ways to do these steps, and it is not surprising that different, equally competent, investigators may make different decisions about how to identify the studies and how to identify the most relevant results. This is particularly true in the area of observational epidemiology research, as opposed to clinical trials research. Research designs and methods of conduct and reporting are much more standardized in clinical trials research than they are in observational epidemiology. In the

area of research on talc and ovarian cancer (which is observational) there are many opportunities for judgement of the author of the meta-analysis to come into play, and in section 5.3.1 I have listed some of the decisions that I made, in the way I managed the selection of studies.

The two other meta-analyses were conducted by Berge et al (2018) and by Penninkilampi et al (2018). They conducted rather different search procedures than I did. Since I had already participated in the IARC review and the Langseth 2008 paper, I already had a head start on collecting the relevant scientific literature. **Appendix B** shows a 3-way comparison of the studies that were included in the meta-analyses by the three authors, and the data from each study that were judged to be most relevant by each author.

As a generalization, it can be seen that the three synchronous meta-analyses identified more or less the same studies and that in general they extracted the same result from each study; but this was not always the case. For my own meta-analysis, I was comforted to note that there was no study that was identified by one of the other meta-analyses that I had missed in my search of the literature (Appendix Table A1).

One of the main points of discordance in procedure was how the three analyses dealt with the Terry 2013 study. Namely, in my Main analysis I used the result of the pooled Ever/Never RR that was quoted by the Terry study, and dropped from consideration the various component studies of the Terry analysis. By contrast, the two others (Berge and Penninkilampi) adopted the strategy of using the results of the individual component studies rather than the overall pooled result. Berge 2018 used the results of the individual component studies as reported by Terry 2013, for most component studies, but for two component studies they used results that were reported in publications that gave results with additional cases. Penninkilampi 2018 also used individual component study results rather than the Terry 2013 pooled result. There are trade-offs between these different approaches. I prefer to use the Terry 2013 pooled result for two reasons. First, a pooled analysis with a standard set of covariates and a standard statistical model is considered superior to a meta-analysis of the components study results. Second, each publication tends to show a variety of results, and the author of the meta-analysis has to choose a

“best” one to represent the “bottom line” from each study. In the Terry pooled analysis, it was the investigators of the original studies, who were also co-authors of the pooled analysis, who chose which would be the “best” result to represent the study, and this in my opinion is more reliable than outside authors making that decision.

Table 4 shows the meta-RR results from each of the three meta-analyses. Notwithstanding the differences in choices and strategies of the three meta-analyses, the meta-RR results are quite similar, ranging from 1.22 (1.13 – 1.30) in the Berge analysis, to 1.28 (1.19 – 1.38) in my analysis, to 1.31 (1.24-1.39) in the Penninkilampi analysis. These three sets of results are really quite close to each other.

The methodology I used is sound and reliable and consistent with the high standards of my discipline. The strategy and decisions I made in relation to the studies selected and the data abstracted from each informative study is consistent with that methodology I use in my professional practice, and that has earned me recognitions and honors throughout the world.

The results shown in Table 4, are in the same “ballpark” as the meta-analysis previously conducted by Langseth 2008 and they are based on a larger pool of accumulated publications. This indicates that recent evidence is consistent with older evidence and reinforces the consistency of the evidence.

6.2.5 Meta-analysis on powdering of sanitary napkins

Tables 2-4 pertain to RRs for the combination of all routes of exposure to the perineum, including direct dusting and dusting on sanitary napkins, diaphragms, underwear, and condoms. When such an exposure variable was not provided in the paper, I used the one that came closest, with priority to dusting on the body directly. Most studies did not report RR results for every route of exposure separately. For the studies that did so, the numbers exposed were much lower than for all routes combined and there was limited statistical power in those analyses. Of the different routes, the dusting on sanitary napkins was generally the most commonly reported route apart from direct dusting. Consequently I assembled the data pertaining to dusting on sanitary napkins and conducted a meta-analysis of those results.

Table 5 shows both the individual studies that had results on sanitary napkin dusting and the meta-analysis result for those studies. The meta-RR was 1.08 (95%CI 0.89 - 1.31), heterogeneity $p=0.09$. Given the overlap between the confidence intervals between this meta-RR estimate for sanitary napkin powdering and the meta-RR for powdering the perineal area via any route (1.28; 95%CI 1.19 - 1.38), it cannot be affirmed that the result for sanitary napkins is statistically significantly lower than the meta-RR results in Table 3 for all routes of exposure; but the tendency is in that direction.

Berge 2018 and Penninkilampi 2018 also meta-analysed the data on use of powder on sanitary napkins. By contrast with my results, Berge 2018 reported an RR of 1.00 (95% CI 0.84-1.16) and Penninkilampi 2018 reported an RR of 1.15 (95% CI 0.94-1.41). Since their publications do not make it clear which studies and which results were used in these analyses, I cannot see easily what explains the discordance among the three meta-analyses for sanitary napkins powdering. In any case, it certainly appears that the RR was lower for application to sanitary napkins than it was for general perineal application. The interpretation of this finding is not self-evident. The different routes of exposure may entail very different frequency of exposure. For instance, whereas use of powders on sanitary napkins might involve exposure on only a few days per month, regular use on the perineal region often involves daily or near daily application. I am unaware of any evidence that would address the question of whether regular use on sanitary napkins leads to greater or lesser delivery of talc particles to the portal to the ovary than does regular powdering on the perineal region.

In any case, irrespective of the evidence regarding sanitary napkin exposure, the results in Tables 2 and 3 clearly show an association between exposure to talc in the perineal region and risk of ovarian cancer.

6.3 Dose-response – cumulative exposure, duration and frequency

An important part of the evaluation of causality is to determine whether the results display any kind of dose-response pattern. Tables 6 to 8 show results for various quantitative metrics of exposure.

Trends by cumulative exposure: **Table 6** shows results from five publications that presented results based on a cumulative amount metric. Four of the studies were based on counts of numbers of powderings, while the Cook 1997 result was based on counts of the number of days on which powdering occurred. As can be seen by perusing the column of numbers of exposed cases, the Terry 2013 results dwarf the others in terms of the statistical information they contain. The Schildkraut study, with about one-tenth as many subjects as the Terry study, nevertheless has as many subjects as the other three studies combined. The relative statistical power of the different studies is also manifested in the width of the confidence intervals.

The evaluation of the statistical significance of a trend is not a methodologically straightforward endeavour. Of particular concern is the question of whether or not the test for trend among subjects in different “dose” categories should include or exclude the unexposed category. My view is that it depends on whether or not the study results for Ever/Never exposure are part of the buffet of results presented by the authors. Namely, if the only result presented is a dose-response analysis, then it is appropriate to include the unexposed category as part of the study results. If the Ever/Never result is presented and then a dose-response analysis is conducted, it is preferable to maintain statistical independence of the two analyses by excluding the baseline unexposed category from the dose-response analyses. I will interpret the data from these studies in light of this interpretation of trend tests.

The three smallest studies in Table 6 show no evidence of a dose-response pattern. However, the estimates are so imprecise, as evidenced by the very wide confidence intervals, that they are virtually uninformative regarding the presence or the absence of dose-response.

When looking at the Terry 2013 results, which assemble data from eight teams and 10 studies, the confidence limits are much tighter and the estimates of RR much more precise. The p-value for trend (excluding the unexposed group) is 0.17. Nevertheless, with a reference value of RR=1.0 among unexposed, and with point estimates of RR in four quartiles of cumulative exposure of 1.14, 1.23, 1.22, and 1.32, these results are certainly

compatible with the presence of an underlying dose-response relationship. Note that the absence of statistical significance of the trend among the four exposed subsets is not equivalent to the demonstration of an absence of dose-response. Similarly, the Schildkraut 2016 study results, while based on only two lifetime cumulative “dose” categories with point estimates of 1.16 and 1.67, are also compatible with a dose-response pattern.

Trends by duration of exposure: **Table 7** shows the results of those studies that presented RRs by duration of use. The Terry 2013 pooled analysis did not report results by duration of use; however, some of its constituent studies did so and are included here. The numbers in each of the duration categories in each of these studies is quite small, and consequently the RR estimates are very imprecise, with wide confidence intervals. The categorisation of duration differed quite a bit among the studies and it is not easy to compare results between studies. There is no indication of a dose-response relationship in these results. Though, the wide confidence intervals make it impossible to affirm that there is evidence against dose-response. Further, the largest study showing results by duration of use, Wu 2015, did find a significant increase in risk with increasing duration.

Trends by intensity of exposure: **Table 8** shows results of those studies that reported by intensity (i.e. frequency) of usage. This ignores duration of usage. Like the results in Table 7, the results in individual studies are based on rather small numbers and they entail imprecise estimates of RR. Also like Table 7, the pattern of results is equivocal. There is no clear evidence for or against an underlying dose-response.

The Berge 2018 paper also looked at dose-response. They only looked at trends by duration of usage and frequency of usage, analogous to my Tables 7 and 8. However they actually fitted continuous variable models and found that there were significant trends in risk by duration and by frequency of exposure. They did not examine trends by cumulative exposure, and in particular they did not use the results from the Terry 2013 pooled analysis, which in my view is the most informative evidence available on dose-response.

Penninkilampi 2018 looked at risk according to long duration of usage and found no trend. They also looked at cumulative exposure with total number of applications, and they reported a slightly higher RR for women with greater than 3600 applications (RR=1.42)

compared with women who had fewer than 3600 applications (RR=1.32). I cannot determine from the paper which studies were included in this analysis and in particular whether the pooled Terry 2013 dataset was included. While the Terry 2013 and Penninkilampi 2018 papers both contained some results on dose-response, they are not included in Tables 6-8 because they are not original data collection studies; like mine, their's is a review of other studies which are contained in Tables 6-8. As indicated above, all other things being equal, the best metric of the three quantitative ones is the cumulative exposure metric, and that is the one that happens to provide the most statistically reliable data. Thus, the evidence from Table 6 overrides the weaker evidence from Tables 7 and 8. The evidence from the Terry 2013 paper is the most important piece of evidence we have on dose-response. The evidence from the Terry 2013 paper is compatible with the presence of a dose-response relationship between use of powder and ovarian cancer.

6.4 Subtypes of ovarian cancer - in particular, serous invasive tumors

Most studies that provide results on RR between talc powder and ovarian cancer provide results for all types of ovarian cancer combined. Less than half of the published studies have also provided results of the associations between talc powder exposure and various subtypes of ovarian cancer.

To the extent that talc exposure might have different effects on different subtypes of ovarian cancer, there would be a clear advantage to segregating the evidence by type of ovarian cancer and evaluating the evidence for each subtype. The serous-invasive subgroup comprises over half of all cases, and the rest are split among several other histology-behaviour subgroups (mucinous, endometrioid, clear cell, others, and these can be further subdivided by invasive or borderline). Those latter subgroups entail very small numbers each and barely provide enough data, in most studies, to produce informative risk estimates. In those studies, where results were presented by histologic-behaviour subgroups, it is my judgement that there is no strong consistent pattern indicating that one subtype has higher risk than another. Of course, there is variability in point estimates of RR, but on the one hand the variability in RR estimates between ovarian cancer subtypes within studies is not greater than would be expected from chance variability (mostly, the

confidence limits overlap considerably), and on the other hand, from study to study, it is not always the same subtype that seems to have the highest or lowest relative risks.

In the largest assembly of cases subdivided by histologic subtype, the Terry 2013 pooled analysis, the results by subtype were as follows:

- Serous: n=1197; RR=1.24(1.13-1.35)
- mucinous: n=94; RR=1.06 (0.82-1.36)
- endometrioid: n=304; RR=1.20 (1.03-1.40)
- clear cell: n=187; RR=1.26 (1.04-1.52).

Other than serous invasive tumors, there is no other subtype for which there are sufficient numbers of studies and sufficiently precise estimates of RR in each study to provide reliable estimates of the overall RR. While the results for endometrioid and clear cell tumors show risks that are closely aligned with those for serous tumors, the result for mucinous tumors are so imprecise, because of the very small numbers of such tumors, that the estimated RR of 1.06 is very unreliable.

Consequently, and because there were multiple studies apart from Terry 2013 that presented results for serous tumors, I decided to conduct a meta-analysis for serous/invasive ovarian cancers, but not for other subgroups. The meta-analysis on serous invasive tumors will indirectly inform us also about the relative risks for other types of ovarian cancer. Namely, if the RR for serous invasive tumors is similar to that for all ovarian tumors, it will imply that the risks for other types (the complement of serous invasive tumors) will not be very different from the overall RR. If the RR for serous invasive tumors is much greater than that for all ovarian tumors, it will imply that the risks for other types (the complement of serous invasive tumors) are lower than the overall RR. Similarly, if the RR for serous invasive tumors is much lower than that for all ovarian tumors, it will

imply that the risks for other types (the complement of serous invasive tumors) are higher than that for all ovarian cancer.

Table 9 shows all the studies that reported results concerning the link between talc exposure and serous/invasive tumors. There were 8 informative studies, including Terry 2013, which carried by far the most statistical weight. The meta-RR estimate for serous/invasive tumours was 1.25 (1.1.15- 1.36). This is very similar to meta-RR for all ovarian tumors, albeit based on a smaller number of informative studies. Thus there is no persuasive evidence in these studies, taken as a whole that the effect of talc differs by histologic subtype of epithelial ovarian cancer. That is, with such a tiny difference in RRs between that for all ovarian cancers combined and that for serous invasive ovarian cancers, it can be safely inferred that the RR for other types of ovarian cancer (the complement of serous invasive) would not be far from the overall RR of 1.28.

6.5 Conclusion from meta-analyses and dose-response considerations

My opinion, based on up-to-date data and meta-analyses, is that the RR between ever perineal use of talcum powder products and ovarian cancer (all types combined) is 1.28 (95%CI 1.19-1.38). This result is highly statistically significant.

We can rule out random variability as a possible explanation for the apparent excess risks. Further, the examination of results according to the “amount” of exposure, and notably the cumulative exposure variable used by Terry 2013, shows that the higher the exposure, the higher the risk.

Such a pattern of findings can have only two possible explanations: it must be the result of some sort of bias or confounder that operated in multiple studies or it must be the result of a real causal association.

7. Misconceptions and possible biases

In reaching my opinions, I have objectively looked at the data and scientific literature and considered the points of view of others who do not share the conclusions I have reached. There are generally two sources of disagreement: misconceptions of epidemiologic or

statistical concepts which I address below in Section 7.1 and professional judgement of the likelihood of errors and biases in the various epidemiological studies, which I address in Section 7.2.

7.1 Some prominent misconceptions in reviewing the evidence

Table 10 lists some prominent misconceptions, and I will address them here.

Misconception: "Cohort studies are more valid and informative than case-control studies."

As can be seen in Table 2, the case-control studies tended to produce higher RR estimates than the cohort studies. It has sometimes been claimed that cohort studies are more valid than case-control studies. There is no theoretical or practical reason why such a blanket assertion should be universally true. There are many factors that influence the validity of a particular result in a particular study and it cannot be reduced to any simplistic assertion that cohort studies are more valid than case-control studies, or vice versa. In the next section, I will go through a number of potential sources of distortion of results from epidemiologic studies, and I showed that some of them might occur in cohort studies, some in case-control studies, and some in both. Some of these distortions very likely occurred in some or all of these studies that provide data on talc and ovarian cancer. On balance, I believe the results of each of these case-control studies concerning female use of powders and ovarian cancer are credible, and perhaps more so (for reasons given in section 7.2), than the analogous results of each of these cohort studies.

Misconception: "Hospital-based case-control studies are more valid and informative than population-based case-control studies."

In a case-control study, the design objective is to define a study base, or a population base, in which the cases might occur, and to identify representative samples of cases and of controls in that study base. The purpose of a control group is to provide an estimate of the prevalence of exposure to the factor under study in the base population that gave rise to the cases. In many instances, the best source of controls for case-control studies is a population list of some sort. But sometimes using a population list is not feasible or

desirable, and an alternative can be to select controls from among hospital patients with conditions other than ovarian cancer. This was done in some of the ovarian cancer case-control studies.

The most common generalization made by epidemiologists is that population-based case-control studies are more valid than hospital-based case-control studies. In fact, neither this nor the opposite statement that I articulated as a Misconception, is universally correct. Validity of a case-control study depends on the specific design features and circumstances of the study.

It is possible that some types of hospital controls have patterns of usage of powders that are different from those of women in the general population, either because the powders are actually causally associated with the diseases that those women have or because their disease or condition that led them to be hospitalised induces some women to take up the use of such powders. If such a mechanism was present in a hospital-based case-control study, it would likely lead to an artificially attenuated RR, not an artificially inflated RR.

Misconception: "Counting the number of statistically significant results is a valid way of assessing consistency of results among multiple studies."

This misconception betrays a lack of understanding of statistical significance. As can be seen in Table 2, several of the individual studies listed in my meta-analysis did not find a statistically significant increase in RR. This has been cited by some as evidence that there is no real causal link.

In fact, meta-analysis is a method that was developed precisely because counting significant results is an invalid way of synthesising knowledge. Namely, a result from a single study may fail to achieve statistical significance either because there is no risk in that study, or because the statistical power of the study was limited. Meta-analysis was developed in order to combine evidence from multiple studies that may be under-powered on their own, but when combined show an effect that might be statistically significant. The meta-analysis cannot conjure a statistically significant meta-RR if the individual study RRs do not systematically lean in the direction of an excess risk, and they do so in the area of talc and ovarian cancer to a degree that cannot be explained by random fluctuation.

Misconception: "You cannot prove causality with an RR less than 2.0."

There is nothing in epidemiologic theory or practice that justifies such a statement. Indeed, this assertion about an $RR \geq 2.0$ threshold does not exist in epidemiology. There are many well-established causal relations where the RR is less than 2.0. Table 11 lists a number of such examples. In clinical medicine also, it is very common to strive to find therapies that reduce the risk of death from some disease by as little as 10%, and several such discoveries are well documented and have been integrated in medical practice, even though the change in risk is small.

Misconception: "If a product has been used for a long time it must be safe."

It has been argued that since talc powder has been used for many decades by millions of women (and men and children), it has stood the test of time and should be considered safe. This is a specious argument.

Most agents in our environment or in our lifestyle which are now considered dangerous were used for decades or centuries without falling under a cloud of suspicion. These include such factors as cigarette smoking (many cancers and cardiovascular disease), asbestos (lung cancer), sunlight (skin cancer), ingesting very hot liquids (esophageal cancer), and many others.

Misconception: "Government agencies provide the most reliable and authoritative statements regarding the lack of carcinogenicity of talc."

Various national and international agencies have websites which list carcinogens. Examples are: National Cancer Institute (NCI), National Toxicology Program Report on Carcinogens (NTP-RoC), International Agency for Research on Cancer (IARC). It can be argued that these agencies, which undoubtedly have scientific credibility, would not put on their websites information that is out of date or invalid. However, that claim is false.

IARC has a rigorous evaluation process which is considered quite authoritative throughout the world, including in the U.S. But the evaluation is carried out at a certain point in time. The last time talc was evaluated by IARC was in 2006. Based on the evidence available then, the panel rated talc as a "possible" carcinogen. Additional evidence has been accumulated

and come to light since then, but there has not been a new evaluation by IARC. (There are potentially thousands of agents to evaluate, and IARC has resources to only evaluate a few each year. Thus they cannot keep re-evaluating the same ones as soon as new evidence is published.)

NTP-RoC is a congressionally-mandated program whereby the agency is obligated to periodically publish lists of known and suspected carcinogens. Unlike IARC, it appears that the people who make the decisions are internal RoC scientists, rather than external experts, with advice from outside experts. Also unlike IARC, the biennial reports only contain listings of those agents that have been deemed to be definite or likely carcinogens, so there does not seem to be a statutory listing of all agents that have been considered. From the minutes of a meeting of the Board of Scientific Counsellors of NTP held in 2000, it appears that the issue was deferred. I am not aware that the RoC has conducted a subsequent review of talc; although, when renominated in 2004, NTP deferred to IARC.

NCI provides a website for doctors where they indicate for each type of cancer, what are the known risk factors. Based upon my understanding, they do not carry out a rigorous evaluation along the lines of the IARC evaluations or even the NTP evaluations. It is a rather superficial process compared with the IARC process and it depends on the existing knowledge of the committee members which in a short time opines about possible associations between each of the scores of cancer types and scores of potential risk factors. This is not to argue that the members of these committees are less expert than the members of the IARC committees, but the NCI committee members have a short time (apart from their main jobs) to review hundreds of possible factor-cancer associations, whereas the IARC committee members have weeks to review just a few.

Scientists and public health agencies regularly consult the IARC evaluations and those of the NTP. The NCI website for doctors is not considered an up-to-date and cutting edge source of information. This is, of course, no reflection on the gravitas of the NCI as a whole, which has much more invested in its original research mission than in its website for doctors.

There are other organizations which may put some information about causes of cancer on their websites. Importantly, I have not seen any agency or organization, including the FDA, that conducted a rigorous evaluation of the epidemiologic and non-epidemiologic studies like we did at IARC in 2006.

Misconception: "A biological mechanism must be proven before we can establish causality"

There are innumerable examples in medical history of discoveries of risk factors or treatments that did not require knowledge of the mechanisms of pathogenesis in order to determine causality. I have compiled a few such examples from medical history and show them in **Appendix C**.

Very often, the initial suggestion was met with scepticism from the vantage point of biologic plausibility. In fact, very seldom have the essential features of biologic plausibility been worked out by the time the epidemiology has convincingly demonstrated that the association is causal. This can be asserted for the early discoveries such as the cancer causing effects of certain chemicals in dye production facilities, certain metals in various heavy industry facilities, certain emissions of combustion of fossil fuels, ionising radiation, and even cigarette smoking. In most of these examples, it was decades after the epidemiologic evidence became convincing that credible mechanistic theories were proven; though, for some, the biologic mechanisms remain unknown.

Indeed in the guidelines of the IARC Monographs, it is stated that if there is "sufficient" evidence of a risk of cancer from epidemiologic studies, then irrespective of the evidence from animal experimentation and other biologic evidence, the agent in question should be considered a Group 1 carcinogenic agent. My point here is that the demonstration of a proven biologic mechanism is not a prerequisite for demonstrating that an agent is a human carcinogen. Reliable empirical epidemiologic evidence of an association is a sufficient basis for demonstrating causality; the presence of a credible biologic mechanism enhances the degree of proof, though that often lags decades behind the general recognition of causality, as exemplified by the examples in Appendix C.

It is not my opinion that we should ignore or set aside consideration of biologic plausibility. As Hill (1965) indicated in outlining the thought process for establishing causality, biologic plausibility is one of the dimensions to be considered. But, he also cautioned that, “this is a feature I am convinced we cannot demand”. Thus, as I have done in other contexts in regard to other putative carcinogens, I am able to draw causal inferences about talc irrespective of whether a causal mechanism has been proven.

Misconception: “Bradford Hill criteria comprise a checklist of necessary conditions”

As I explained in section 4.2, the “aspects” that Hill listed are not “criteria” and they are not necessary. This point has been made and is widely accepted by epidemiologists. The list of “aspects” in Hill’s original paper have been rephrased and reworked in many textbooks and by most agencies that refer to them. They provide a framework and not a checklist.

7.2 Alternative explanations - Biases and errors

Before inferring that the strong statistical evidence that use of powder in the perineal area by women is associated with ovarian cancer may represent a causal relationship, I considered alternative explanations for these observations. In this section I will consider a number of potential sources of distortion of the risk estimates, under various rubrics. Some of the potential sources of distortion are unique to cohort studies, some are unique to case-control studies, and some can affect both types.

7.2.1 Bias due to non-response or non-participation

This is a potential source of bias in case-control studies.

Among all potential cases and controls who meet the study’s eligibility criteria, some participate and some don’t. The most common reasons for non-participation are: refusal; inability of the researchers to contact the person because they moved or are too sick or died or are otherwise unavailable; if access to the subject is via the treating physician or medical staff, there could be obstacles at that level. If the factor under study, hygiene powder use, is correlated with the likelihood of participation and if the participation rate is low, this could lead to biased estimates of RR. Such bias could artificially inflate or deflate the RR depending on how the various variables are related to each other. If response rates

are low, say below 70%, and differential both by case-control status and by exposed – non-exposed status, this could lead to biased RR estimates. For such a bias to explain the outcomes seen, it would require quite strong associations between likelihood of participation and powder use, and quite strong differences in such associations between cases and controls. In my opinion, it is very unlikely in the context of these studies that response rate differentials would be great enough to induce such large bias.

7.2.2 Recall or reporting bias

This is a potential source of bias in case-control studies.

Because the exposure history is collected retrospectively, it is subject to both non-differential recall errors (see below), and to recall or reporting bias between cases and controls. Cases and controls may have different motivation and proclivities to recall and report use of powders. If it were true that cases had a greater tendency to over-report powdering history or if controls had a greater tendency to under-report powdering, then this would lead to an artefactual exaggeration of the RR.

There are a few possible causes of such differential reporting. First, it might be hypothesized that there is a general tendency for cases in case-control studies to acknowledge behaviours or exposures with much greater frequency than controls just because they are more invested in the research than are controls. They may wrack their brains during the interview to find instances of the queried behaviour or exposure that controls don't pay much attention to during the interview, because the controls just "want to get the interview over with". If this were the case, we would systematically see elevated RRs from case-control studies for all manner of variables in all kinds of studies. But in my experience, this does not occur. (I have conducted many case-control studies, each study eliciting information on many lifestyle factors and exposures. It has not been the case that cases systematically report more exposures than controls.) Furthermore, and more pointedly, if such a phenomenon were operative in these case-control studies of ovarian cancer, we would see elevated RRs when women were questioned about the use of powders on other parts of their bodies than the perineal area. In fact, several studies did ask such questions. In the Terry 2013 analyses, based on very large numbers of women, the

overall RR for ever use of hygiene powder on non-genital areas of the body was 0.98 (0.89-1.07), in stark contrast to the analogous result for genital use of 1.24 (1.16-1.33). In other words, when questioned about powdering in non-genital areas, controls were as likely to say “yes” as cases. Clearly there was no tendency for cases to indiscriminately report exposures more frequently than controls.

A second possible reason for such a situation to arise is if there was widespread knowledge about powdering being under suspicion for ovarian cancer. In such a situation women who have heard about this might internalize the notion that powdering may have caused their cancer, and they might ruminate with such intensity on the notion that they might imagine that they had used powders at some point in the past. But for most of the period of data collection in these studies, there was very little public discussion of a possible linkage between powdering and ovarian cancer and I doubt if more than a handful of the thousands of women interviewed in these studies would have heard of such a hypothesis before being interviewed.

In my opinion recall bias is not likely to have produced the kinds of RRs we see in these studies.

7.2.3 Non-differential (or random) error in recall or reporting of exposure to powders

This is a potential source of bias that would affect both case-control and cohort studies, but not exactly in the same ways.

Reporting past history of activities and exposures is always subject to some degree of error; it can result from ambiguity or misunderstanding of the questions, failures of memory, or inattention. And this is certainly true for history of powdering. If such error is non-differential (i.e. equally present for cases and controls in the case-control context) it has an effect on RR estimates that is rather predictable. Namely, as I explained above, it has the effect of artifactually decreasing the RR. The degree of attenuation is roughly proportional to the degree of error or misclassification. If there really is a causal association between powdering and ovarian cancer, then we can be rather certain that the true RR is higher than what we can see in the various studies that have reported RRs.

Furthermore, we might make some reasonable inferences about the impact of reporting error on dose-response trends as well as on the overall RR. It is reasonable to surmise that the amount of reporting error is quite a bit higher for the details of past usage (duration of usage, intensity and frequency of past usage) than it is for the simple fact of usage. That is, there is less error in a woman's report of whether or not she ever used powders on a regular basis than in her report of the details of the usage, even if powdering behaviour may be a relatively stable habit. The consequence of this is that the RR based on ever/never usage (Table 2) is less subject to artefactual attenuation than the RRs based on categorizing the duration or intensity or cumulative amount of usage (Tables 6-8). This is a possible explanation of why there has been a much clearer signal of elevated RR for ever/never usage than there has been for dose-response.

There is likely to be more measurement error of exposure to powders in cohort studies than in case-control studies, for several reasons. First, because the cohort study questionnaires attempted to broach topics that could be relevant to many types of cancer and indeed many diseases, the questions posed in the cohort study questionnaires about talc powder use tended to be much briefer and probably less effective at eliciting valid information than the questionnaires used in case-control studies of ovarian cancer. For instance, the cohort studies did not elicit information on timing or duration of past usage, and one of the cohort studies did not even attempt to elicit information about use of talcum powder products over 12 months before the interview. Second, whereas a case-control design involves a woman looking backwards over her life from the time of incident cancer onset and thereby addressing the entire relevant period of potential exposure, the woman in a cohort study reports on her past usage as of a certain point in her life, but there may be 10-20 years subsequent in which her habits could have changed, and of which the cohort study has no knowledge. The women in the cohort studies were "locked into" their exposure category at baseline of the cohort study. If there were women who in fact started using powders after the baseline, they would be incorrectly labelled as non-users. And, if there were indeed a risk associated with use of talc powders, the risk estimate would be diluted by the incorrect inclusion of users among non-users. Accordingly, the longer such subjects are followed, the more likely such misclassification is to occur.

The age at which information is collected is a relevant consideration. In most case-control studies, the mean age of the study subjects was between 50 and 60. In the NHS cohort study the mean age at baseline questionnaire was around 40 and in the WHI it was over 60. In each study, women were asked about their past history of powder usage. Clearly the WHI women had a further stretch of time to consider than the women of the NHS and even of the case-control studies.

A particular form of measurement error may well have occurred in the Gonzalez 2016 study and produced even more attenuation of RR estimates. Namely, in their brief questionnaire on talc exposure, the question was formulated to ask women about their use of powders in the 12 months preceding the interview. While exposure to talc over the past 12 months may be correlated with exposure over the entire etiologically relevant period, which might go back decades in the life of the woman, the correlation is probably weak, and this is another source of measurement error.

7.2.4 Short follow-up periods for disease ascertainment

This is a potential source of bias that would affect cohort studies.

In a cohort study, if the period of follow-up after baseline is relatively short; and if the latency period between exposure and cancer is long, the excess risk may not be detectable because cases that would occur after long latency have not had time to occur. If this did occur, it would lead to an artificially low RR estimate.

This could have been an issue in the initial publication from the NHS, the Gertig 2000 paper. As of the Gates 2008 and Gates 2010 analyses of the NHS, the follow-up period was probably long enough and this bias should have abated. For the WHI study it was likely an issue in the Houghton 2014 paper, and it would remain so until there is much longer follow-up. It would also be an issue in the Gonzalez 2016 paper from the Sister Study, which had only 6 years of follow-up after exposure was ascertained.

7.2.5 Diagnostic error

This is a potential source of bias that would affect both case-control and cohort studies, but not exactly in the same ways.

The diagnosis of cancer is never error-free. And details of histology and staging are even more error-prone. Further, there are trends in diagnostic criteria and methods over time, as well as in the terminology and classifications used. So what we observe in these various studies of ovarian cancer represents imperfect estimates of true biologic/pathologic status. The impact of such “errors” is mainly the same as exposure measurement error, namely it would tend to artificially reduce RR estimates. Since most case-control studies start from hospital-based cancer diagnoses as the point of entry, they usually have reasonably valid diagnostic information.

In general, cohort studies tend to be more vulnerable to this source of error and bias, because disease diagnosis information is often obtained from sub-optimal sources, such as the information provided by the study subject or her family, or information obtained from death certificates. In the three cohort studies included in the meta-analysis, there were high quality verifications of diagnostic information that had been provided by the women or their families. But such verification may not be as reliable as information coming straight from hospital pathology or oncology services. I expect that this was not a major issue here, but to the extent that it did operate, it too would have led to some additional attenuation of RR estimates, as I explained above.

7.2.6 Initiation of powdering as a result of ovarian cancer

This is a potential source of bias that would affect case-control studies.

It has been speculated that women with early symptoms of ovarian cancer might take up the use of powders to help with relief of their symptoms. If so they might report that they used powders before their cancer was diagnosed and this could artificially inflate the RRs. While the women are usually questioned about the period before their cancer was diagnosed, there could be some “telescoping” so that women who start dusting after diagnosis respond in the affirmative to the questionnaire.

In the same vein, it has been speculated that treatment for ovarian cancer might produce side effects that could be relieved by powdering. And again, it might be posited that women ignore the instruction to refer the exposure question to the time before the onset of the cancer.

If the early symptoms of ovarian cancer provoke some women to start dusting the perineum to relieve some of the discomfort, or if the treatment provokes women to start dusting, this would lead to an artefactual excess RR.

I have not found any empirical evidence to support this hypothesis.

In the few datasets I have seen which describe the age distribution of initiation of powdering, there were very few patients who started in the year or two before diagnosis of the cancer. I am inclined to believe that it is virtually a non-issue, and that if it operated at all, it would only have operated on a handful of the thousands of women who were part of the various case-control studies.

7.2.7 Confounding

This is a potential source of bias that would affect both case-control and cohort studies.

If women who use powders are also more likely to be exposed to other risk factors for ovarian cancer, then it might distort the relationship between powdering and OC. The direction and the degree of distortion (bias) that would be induced depends on two components, a) the true association between the confounder and ovarian cancer, and b) the association between the confounder and dusting behaviour. Thus, depending on the direction of these two component associations, the confounding can result in artificially decreased or increased RRs. Typically, the degree of confounding is much lower than the strength of the association between the confounder and ovarian cancer. In order for a confounder to induce an artificial RR of 1.25 for dusting, it would have to have an RR much greater than 1.25 with ovarian cancer and a fairly strong correlation with dusting behaviour. Given that the main studies have controlled for the main risk factors, I consider it unlikely that this operates. Table 1 shows the covariates that were controlled for in each study, and while there is some variability between studies in the list of covariates, the main known potential confounders (age, BMI or weight, parity) have been controlled for in almost all studies. It should be noted that while smoking is a well-established risk factor for many types of cancer, it is not a risk factor for ovarian cancer; thus, there is no need to control for smoking status in studies of ovarian cancer.

A thorough and reliable investigation of potential confounders was conducted by Cramer (2016); in the large database of New England-based studies, they explored the potential confounding effect of a host of personal characteristics including demographic, reproductive, hormonal, comorbidities, activities, and exposures. None of the covariates that they explored had any meaningful confounding effect on the association between talc and ovarian cancer.

7.2.8 Publication bias

This is a potential source of bias that would affect case-control and cohort studies.

This refers to the tendency for some evidence never to “see the light of day”. Namely, when results are “negative” or “null”, it may be that investigators never bother to submit them for publication, or alternatively, that editors refuse to publish them. This happens, most likely, when the hypothesis under study is not particularly topical or controversial, and when the study is small. In the talc-ovarian cancer literature this would have been more likely in the pre-2000 era when there was much less scientific interest in the hypothesis linking talc to ovarian cancer. As a sensitivity analysis, I conducted a meta-analysis on the subset of studies in Table 2 that had at least 20 exposed cases. That is, I eliminated the studies from that stratum of the universe of studies that were most susceptible to publication bias. The resulting meta-RR was almost identical to those shown in Table 4. Because this has been a somewhat controversial topic in epidemiologic circles over the past 20 years, I doubt if there were large important studies with null findings on talc-ovarian cancer that went unpublished.

In their meta-analyses, Berge 2018 and Pennikilampi 2018 both showed funnel plots of the results. These are meant to detect so-called publication bias. Both of those analyses concluded that there was no publication bias.

In summary, I consider that the observed association between talc and ovarian cancer is not an artefact due to publication bias.

7.2.9 Summary comments regarding biases and errors

While the results of epidemiologic studies strongly supports the hypothesis of an association between perineal use of powders and risk of ovarian cancer, we must be wary of potential sources of error and bias that can distort an association before concluding that this association is causal. I have therefore gone through the plausible sources and types of error and bias that could potentially explain the positive association seen across the relevant studies to ascertain how likely it is that each such type was actually operative and, if so, what the nature of the impact may have been. These evaluations are based on my professional opinion as an epidemiologist having conducted, reviewed, and evaluated many hundreds if not thousands of epidemiologic studies.

Of the various types of error listed, some could artificially inflate the RR estimates and some could artificially decrease the RR estimates. Some are likely to have occurred and some are unlikely to have occurred. The one that certainly occurred and that has a non-trivial attenuating effect on RRs is random exposure misclassification (section 7.2.3). As explained above, if there is a true association, then the true RR is almost certainly greater than the estimates seen in these studies and in the resulting meta-analyses. Other types of error and bias that are highly likely to have occurred are the two that are specific to cohort studies. Namely, the Nurses' Health Study papers (Gates 2008 and Gates 2010) almost certainly suffered from an attenuated RR estimate because of the compromised reference category of "unexposed" while the Women's Health Initiative paper (Houghton 2014) and the Sister Study paper (Gonzalez 2016) almost certainly suffered from a too short follow-up period (section 7.2.4). In my opinion, the occurrence and the possible impact of other listed types of bias and error are more speculative, and less likely.

Consequently, in my opinion, the observed association between talcum powder products and ovarian cancer is unlikely to be explained by any methodological problems with the studies.

8. Bradford Hill guidelines applied to talc and ovarian cancer

The Reference Guide on Epidemiology of the Manual on Scientific Evidence (2011) states: "There is no formula or algorithm that can be used to assess whether a causal inference is

appropriate based on these guidelines.” These guidelines are simply aspects that might be considered in assessing causality. I will give my assessment of how the evidence regarding talcum powder products and ovarian cancer fit into those aspects. I will use the version listed in the Reference Manual on Scientific Evidence. While there is no objective basis or scientific precedent or “scientific jurisprudence” for quantification or weighting of the various “aspects”, to help the reader to understand the relevance that I attached to each “aspect” in my evaluation, I will provide an informal ranking of the importance that I attach to each aspect, in the specific context of the assessment of causality of evidence regarding talcum powder products and ovarian cancer. I will list the aspects in descending order of importance that I attach to them.

My opinions are briefly summarized in **Table 12**.

Highly important aspects in my weighting

There is a set of B-H aspects that are utterly inter-related and cannot be disassociated one from the other. In combination, they represent the most important aspect to consider in evaluation of causality of talcum powder for ovarian cancer. These include strength of association, dose-response, consideration of biases, and consistency of findings.

Strength of the association. This can embody both the magnitude of the RR and its statistical significance. The meta-RR estimate is 1.28. That means that the best estimate from the epidemiologic literature is that women who regularly used talcum powder products in the genital area had 28% higher risk of ovarian cancer than women who did not use such powders. As I illustrate in Table 11 with a few examples, this RR is in line with many well-recognized risk factors for cancer and other diseases. For example, it is well accepted now that people living in an urban neighborhood in which the air is highly polluted with particulate matter have between 5% and 10% excess risk of lung cancer compared with people living in a less polluted urban neighborhood. Also, it is well accepted now that workers exposed to a solvent called trichloroethylene have about a 40% higher risk of kidney cancer compared with workers not exposed to trichloroethylene. Thus, the 28% increase of ovarian cancer for women who used talcum powders is in line with many recognized risk factors. This increased risk as manifested by the meta-RR is highly

statistically significant. (Note that the statistical significance of individual studies is irrelevant to the consideration of causality; it is the totality of evidence embodied in the meta-analysis that counts.) Such a high and significant meta-RR could not have occurred by chance. This is a very important factor in how I view the evidence of causality, and it supports causality.

Dose-response relationship. If the relative risk increases when the exposure increases, it enhances the likelihood that the observed association is really causal. In studies of lifestyle habits like use of talcum powder products, the most common way is to estimate the RR in increasing categories of exposure metrics such as duration (years) of usage, or intensity of usage (frequency per day or per week or per month), or cumulative amount of usage (a combination of duration and frequency). The most sensitive of these metrics is the cumulative amount. I evaluated the published studies reported on risks according to the different metrics. By far, the most important set of results on dose-response is that from the Terry 2013 pooled analysis of 10 studies using the cumulative exposure metric. And, the next most important from a statistical weight point of view is that from Schildkraut 2016. In both of those studies, there is a clear indication of increasing risk with increasing cumulative exposure. Since the statistical power to detect a trend is less than the power to detect an overall risk, it is not surprising that the p-value for trend does not attain the conventional 0.05 level, but it remains true that these studies support a dose-response. This is an important consideration in my assessment of causality, and the evidence on dose-response that our IARC committee had available in 2006 was much less persuasive than the evidence available now.

Consideration of alternative explanations - absence of bias. There are many potential sources of bias in observational research, including in epidemiology. It is important to consider the presence of bias in each study performed or reviewed in an evaluation of causality. The possibility of bias is so multifaceted that it is impossible to reliably assign an explicit score to the likelihood of bias in a study or in a body of studies. It is also important to understand that identifying a potential source of bias is not tantamount to identifying the presence of bias. In section 7.2, I have reviewed the potential role of several types of biases and errors

that can bedevil such research. I concluded there that none of those factors would cause the apparent associations.

Consistency of findings between studies (or replication of findings). Because epidemiologic research is susceptible to errors from random variability and from different kinds of study biases, before accepting the apparent association as a generalized phenomenon, it is important to see that similar results are replicated in different studies. When these different studies also encompass different study populations in different communities, it enhances the generalizability of the inferences. Generally speaking, the observation of consistent results in different studies adds to the credibility of an inference that there really is a causal relationship. In my review of the published epidemiological studies and meta-analysis, I am impressed by the consistently elevated risk across studies. Almost all of the 30 or so studies have produced an RR greater than the null (neutral) value of 1.0. If there really were no association between talcum powder use and ovarian cancer, we would expect to see as many RRs lower than 1.0 as higher than 1.0. The pattern we see is like flipping a coin 30 times and getting a heads 28 or 29 times. The individual study RRs are not all necessarily statistically significant, but that is irrelevant because most individual studies did not have sufficient statistical power to detect RR in the range of 1.2-1.4. It is the statistical significance of the meta-RR, representing the combined evidence that has the requisite power, and that excess RR is highly statistically significant. I place great weight upon this evidence of causality and, here, believe it to be amongst the most important findings.

Moderately important aspects in my weighting

Temporal relationship. Exposure should be seen to have preceded disease. It is almost a logical truism. This is the only aspect that Bradford Hill considered to be necessary. In all of the studies I reviewed, the information elicited about talc exposure concerned the time period before cancer onset. Since it is so obviously important, the reader may wonder why I place lesser weight on this aspect. It is simply because the presence of this condition of temporality is so obvious in these studies.

Biological plausibility (coherence with existing knowledge). It is both conventional and natural to consider whether any putative association is biologically plausible. The notion of

biological plausibility is multi-faceted. In the case of talcum powder products and ovarian cancer, it can include such issues as: how such powders have been used, female anatomy and physiology, toxico-kinetics and toxicology of talc, in vitro and in vivo mechanisms of carcinogenesis, and others.

The first thing to note about this aspect that Bradford Hill listed is that it is called “biological plausibility”, not “biological proof”. That is, there was never any implication that a determination of causality should rest on a demonstrated proven biological mechanism. Hill was always reserved about this aspect, stating that it was not an essential prerequisite to establishing causality. As I have mentioned above, it has been common in the history of medicine and epidemiology for the elaboration of a validated biological mechanism to come much later than the discovery and demonstration of a causal association. Appendix C gives a handful of such examples but there are scores more.

Insofar as the issue of talcum powder products and ovarian cancer is concerned, there is evidence to support a few biologically plausible mechanisms. First of all, there are two possible routes that talcum powder products can take to reach the ovaries. There is published evidence that talcum powder products (and its constituents and contaminants) that are applied to the vaginal area can migrate from there to the fallopian tubes and ovaries (Venter 1979; Henderson 1986; Heller 1996) or to pelvic lymph nodes. (Cramer 2007) In addition, as has been hypothesized and partially demonstrated in the discussion of asbestos and ovarian cancer, such particles might reach the ovaries via inhalation and translocation. (Miserocchi 2008; IARC 2012) Once the particles reach the ovaries, carcinogenesis can be triggered by the inflammation engendered by the particles. (Ness 1999; Ness 2000) There is considerable evidence that inflammation is an important mechanism for carcinogenesis (Coussens and Werb 2002; Grivennikov 2010). Alternative plausible mechanisms of carcinogenicity include talc induced oxidative stress (Buz’Zard 2007; Saed 2017; Fletcher 2018), and genotoxicity (Shukla 2009).

The evidence that commercial cosmetic talcum powder products have been shown to contain asbestos, fibrous talc, and heavy metals (Blount 1991; Paoletti 1984; Longo et al 2017, Crowley report 2018) provides a reasonable basis for hypothesizing that these

chemicals may contribute to the carcinogenicity of the talcum powder products. Asbestos is a well-known carcinogen, as are chromium and nickel compounds. It is plausible that any of these, in contact with the ovaries, can be carcinogenic.

The fact that there are credible biologically plausible mechanisms by which talcum powder products can reach the upper genital tract causing an inflammatory response, along with the presence of asbestos fibres and other carcinogens is an important consideration in support of my opinion that the genital use of talcum powder products can cause ovarian cancer.

Aspects of lesser importance in my weighting

Cessation of exposure. It is rare that there is valid evidence available to assess the impact of cessation of exposure in an observational study. In the studies on talcum powder and ovarian cancer, there is no evidence one way or the other concerning the effect of cessation of exposure. This aspect is not applicable and I place almost no weight on it.

Specificity of the association. This aspect is premised on the notion that an agent-disease association is more likely to reflect a causal association if the agent is not also associated with other diseases. In the 1960's, this seemed like a reasonable argument. In light of evidence from the past 60 years, this argument is no longer made and this aspect has fallen out of usage with the demonstration that some agents can indeed provoke multiple different pathologies. Examples include cigarette smoking, ionizing radiation and asbestos fibers.

So, I do not place much stock in this aspect. However, if I did, I would have to say that genital exposure to talc is associated with ovarian cancer and no other morbidity, which supports the 'specificity' of the relationship."

Analogy

Hill argued that if the agent is similar to another agent that has been shown to be a cause of the disease, then the agent under investigation is more likely to be a cause. The fact that exposure to asbestos fibers can cause cancers in lung, larynx mesothelial tissue and ovaries (IARC 2012) can indicate that, by analogy, talc, which is similar in some respects, might be

able to induce carcinogenesis. Thus, there is an argument for an analogy between talc and asbestos. While this aspect supports causality in Hill's framework, I consider it much less important an aspect than the ones listed above.

Coherence with other types of knowledge: Coherence with other knowledge can encompass a multitude of possibilities. This aspect is both vague and very open-ended, with no real operational instruction on how to use it. Hill gave an example in his paper, but the example was only applicable to tobacco and lung cancer. This is an aspect that, if it can be demonstrated, can enhance the likelihood of causality, but its absence cannot detract from causality. I don't consider it to have much weight in this context.

9. Contrast with IARC Monograph and other reviews

The 2006 IARC Monograph meeting, which I chaired, found that a causal relationship was "possible" between perineal talc powder exposure and ovarian cancer. I concurred with that evaluation.

It is now my professional opinion, based on the totality of the evidence that, to a reasonable degree of scientific certainty, the causal relationship between perineal talc powder exposure and ovarian cancer is "probable. "

What has changed in the years since the IARC review?

The RR estimates in Table 2 are remarkably consistent in showing a highly statistically significant excess risk. The number of published study results and scientific literature addressing the epidemiology, toxicology, molecular biology, and mechanistic studies has increased since 2006, and the evidence of excess risk has been consistently demonstrated across the past three decades.

The various possible biases that are on the table remain substantially similar to the ones that were considered by the IARC panel. At the time, we were not convinced that the apparent excess risk could be explained by those potential biases or confounding. As stated above, my review of the relevant studies and potential biases has led me to conclude that bias does not explain the consistent increased risks seen across the credible studies.

There is important new information with regard to the issue of dose-response. Contrary to the impression that the IARC panel had of a total absence of dose-response, and even a possible trend in the opposite direction, the results of three recent publications, Terry 2013 and Schildkraut 2016, using cumulative exposure metrics, and Wu 2015 using duration of exposure, all demonstrate a clear compatibility with a dose-response relationship. The recent meta-analysis of Berge 2018 supports the presence of dose-response in both duration and frequency of use. The most convincing of these is the Terry 2013 pooled analysis, which assembled a larger dataset than all other attempts to assess dose-response combined. Clearly, earlier reviews could not have integrated the results from these recent studies.

It is my opinion, based upon the above the data, there is evidence of a dose-response relationship. Penninkilampi 2018 has recently expressed a similar opinion.

10. Conclusion

The totality of evidence demonstrates that perineal or genital use of talcum powder products is associated with ovarian cancer. Based on contemporary data, my estimated RR between ever perineal use of talc powder products and ovarian cancer (all types combined) is 1.28 (95%CI 1.19-1.38). The body of epidemiologic evidence is remarkably consistent in demonstrating an excess risk. The evidence summarized in Table 6 is compatible with the presence of a dose-response relationship between cumulative exposure to talcum powder products and ovarian cancer. There are various potential sources of bias in these studies, some of which could have inflated the true RR estimate and some of which would have deflated the true RR estimate. Apart from random measurement error, which is inevitable in such studies and which tends to deflate the RR estimates, there is no certainty that the other potential biases were in fact operative and to what degree. It is my opinion, however, that neither bias nor confounding explains the consistent positive association seen across studies. Additionally, there are biologically plausible mechanisms by which talcum powder products can cause ovarian cancer.

Based on the totality of the evidence, it is my opinion, to a reasonable degree of scientific certainty, that the perineal use of talcum powder products can cause ovarian cancer. Given the seriousness of ovarian cancer and its associated morbidity, this causal risk represents an important public health issue.

11. Tables

Table 1. Steps in my evaluation of general causation between talcum powder product use and ovarian cancer

1. Identify all epidemiology study papers that present results on talc and Ovarian Cancer.
2. Extract all RR results from every paper into a database.
3. Determine which of the papers and results present truly independent relevant results.
4. Extract from each study the RR for Ever/Never use of talc in the genital area in relation to OC risk.
5. Conduct a Meta-analysis.
6. Examine the evidence about a possible dose-response relationship.
7. Consider issues of bias, confounding and other sources of error in the various studies.
8. Consider relevant opinion pieces, review articles, and agency reports.
9. Consider opinions from experts regarding possible biological mechanisms.
10. Consider all relevant aspects of association to infer causation.
11. Write report.

Table 2. Relative risk estimates between ever regular use of talcum powders products¹ in the perineal area and ovarian cancer², from various studies used in the Main Meta-analysis or in one or more of seven sensitivity analyses

Author	Included in Main meta-analysis	All tumours			
		Number exposed cases	RR ³	95% CI ⁴	
Booth 1989	?	141	1.29	0.92	1.80
Chen, 1992	?	7	3.9	0.91	10.6
Cook 1997	?	159	1.5	1.1	2.0
Cramer 1982	?	60	1.55	0.98	2.47
Cramer 2016		642	1.33	1.16	1.52
Gates 2008		57	1.24	0.83	1.83
Gates 2010	?	231 ⁵	1.06	0.89	1.28
Godard 1998	?	18	2.49	0.94	6.58
Gonzalez 2016	?	17	0.73	0.44	1.2
Harlow 1989	?	49	1.1	0.7	2.1
Harlow 1992	?	114	1.5	1.0	2.1
Hartge 1983	?	7	2.5	0.7	10.0

Author	Included in Main meta- analysis	All tumours			
		Number exposed cases	RR ³	95% CI ⁴	
Houghton 2014	?	181	1.12	0.92	1.36
Mills 2004	?	106	1.37	1.02	1.85
Ness 2000	?	161	1.5	1.1	2.0
Purdie 1995	?	467	1.27	1.04	1.54
Rosenblatt 1992	?	22	1.7	0.7	3.9
Schildkraut 2016 A ⁵	?	248	1.44	1.11	1.86
Schildkraut 2016 B ⁵		128	1.19	0.87	1.63
Shushan 1996		21	1.97	1.06	3.66
Terry 2013	?	2600	1.24	1.15	1.33
Terry-AUS 2013		705	1.13	0.92	1.38
Terry-DOV 2013		272	1.13	0.93	1.36
Terry-HAW 2013		74	0.99	0.70	1.41
Terry-HOP 2013		194	1.34	1.07	1.67
Terry-NCO 2013		195	1.37	1.05	1.80
Terry-NEC 2013		755	1.28	1.12	1.47
Terry-SON 2013		197	1.35	1.03	1.76

Author	Included in Main meta- analysis	All tumours			
		Number exposed cases	RR ³	95% CI ⁴	
Terry-USC 2013		208	1.36	1.06	1.74
Tzonou 1993	?	6	1.05	0.28	3.98
Whittemore 1988	?	67	1.36	0.91	2.04
Wong 1999	?	157	1.0	0.8	1.3
Wu 2015	?	701	1.46	1.27	1.69

1. In all of these studies the exposure was defined as ever use of powder in the perineal area. In most studies it was further explicitly indicated that the use was regular.
2. In this table we report the result for all types of ovarian cancer combined. With the exception of the Harlow 1989 study that was restricted to borderline tumours, we have assumed that all studies included both borderline and invasive tumours, although this was not always clear in the publications.
3. RR or OR.
4. The confidence intervals are the ones reported by the authors of the respective studies. However in its implementation procedures, the Comprehensive Meta-analysis package recomputes them to be symmetric around the point estimate, on a log scale. Consequently, in the printout of the forest plot of meta-analyses, the printed confidence interval is not always identical to the one shown in this table.
5. Estimated based on Table 1 of Gates 2010.
6. The Schildkraut 2016 case-control study presented two sets of results that both have some legitimacy for the present purpose. Schildkraut 2016A shows the results for all subjects who were interviewed in the study from 2010-2015. Schildkraut2016B shows the results for those subjects who were interviewed before 2014, and who, according to the authors, were not susceptible to having been tainted by publicity from a class action suit.

Table 3. Main meta-analysis and sensitivity analyses conducted on the association between ever regular use of talcum powder products in the perineal area and ovarian cancer (all types combined).

Studies in meta-analysis	N*	RR-estimate				Heterogeneity	
		Meta-RR	95% CI		p-value	I ²	p-value
<i>Main Meta-Analysis - list in Figure 1 Forest plot</i>	21	1.28	1.19	1.38	0.00	32.9	0.07
<i>Sensitivity analyses</i>							
Substitute Gates 2008 for Gates 2010	21	1.30	1.21	1.40	0.00	22.9	0.16
Substitute Schildkraut B for Schildkraut A	21	1.27	1.17	1.37	0.00	30.8	0.08
Add Shushan	22	1.29	1.19	1.39	0.00	33.8	0.06
Substitute List A** for Terry	27	1.27	1.19	1.35	0.00	26.2	0.10
Substitute List A for Terry and Gates 2008 for Gates 2010	27	1.29	1.21	1.37	0.00	16.6	0.22
Substitute List A for Terry and Schildkraut B for Schildkraut A	27	1.26	1.18	1.34	0.00	24.5	0.12
Substitute List A for Terry and add Shushan	28	1.28	1.20	1.36	0.00	27.4	0.09

*N: Number of RRs that went into the meta-analysis. This is not synonymous with the number of studies because some RRs (e.g. Terry 2013, Cramer 2016) embody multiple studies.

**List A studies: Cramer 2016; Wu 2015; Terry-Aus 2013; Terry-DOV 2013; Terry-Haw 2013; Terry-HOP 2013; Terry-NCO 2013; Terry SON 2013

Table 4. Comparison of results of three contemporaneous and independent meta-analyses of the association between ever regular use of talcum powder products in the perineal area and ovarian cancer.

Meta-analysis author	N*	Meta-RR	95% CI	Heterogeneity p-value
Siemiatycki 2018	21	1.28	1.19-1.38	0.07
Berge 2018	27	1.22	1.13-1.30	0.02
Penninkilompi 2018	26	1.35	1.24-1.39	0.31

* Number of published RR estimates that went into the meta-analysis. This does not necessarily correspond to the number of studies, since, for example, the Terry 2013 pooled estimate used in the Siemiatycki meta-analysis embodied 10 studies.

Table 5. Relative risk estimates between ever regular use of talcum powder products on sanitary napkins and ovarian cancer, and results of meta-analysis.

Author	Number exposed cases	RR ¹	95% CI ²	
Chang 1997	51	1.26	0.81	1.96
Cook 1997	38	0.9	0.5	1.5
Cramer 1999	20	1.45	0.68	3.09
Gertig 2000	32	0.89	0.61	1.28
Harlow 1989	8	2.6	0.9	22.4 ²
Harlow 1992	9	1.1	0.4	2.8
Houghton 2014	93	0.95	0.76	1.20
Ness 2000	77	1.6	1.1	2.3
Rosenblatt 1992	21	4.8	1.3	17.8
Rosenblatt 2011	55	0.82	0.58	1.16
Whittemore 1988	5	0.62	0.21	1.80
Wong 1999	13	0.9	0.4	2.0
Meta-analysis		1.08	0.89	1.31
p-value for heterogeneity = 0.09				

1. RR or OR.
2. The confidence intervals are the ones reported by the authors of the respective studies. However in its implementation procedures, the Comprehensive Meta-analysis package recomputes them to be symmetric around the point estimate, on a log scale. Consequently, in the printout of the forest plot of meta-analyses, the printed confidence interval is not always identical to the one shown in this table.

Table 6. Relative risk estimates between subgroups defined by cumulative exposure measures¹ and ovarian cancer², from various studies.

Author	Cumulative applications ³	Number exposed cases	RR ⁴	95% C.I.	
Cook 1997 ⁴	< 2000	20	1.8	0.9	3.5
	2001-5000	24	1.6	0.9	2.9
	5001-10000	21	1.2	0.6	2.4
	>10000	28	1.8	0.9	3.4
Harlow 1992	<1000	18	1.3	0.7	2.7
	1000-10000	54	1.5	0.9	2.4
	>10000	42	1.8	1.0	3.0
Mills 2004	Quartile 1	18	1.0	0.6	1.8
	Quartile 2	28	1.8	1.1	3.0
	Quartile 3	34	1.7	1.1	2.7
	Quartile 4	20	1.1	0.6	1.8
	10000+	18	0.87	0.48	1.57
Schildkraut 2016	≤3600	92	1.16	0.83	1.63
	>3600	152	1.67	1.23	2.26
Terry 2013 ⁵	Quartile 1	534	1.14	1.00	1.31
	Quartile 2	541	1.23	1.08	1.41
	Quartile 3	542	1.22	1.07	1.40
	Quartile 4	586	1.32	1.16	1.52

1. These were all studies that collected information on perineal use of hygiene powders in such a way as to allow construction of a cumulative measure. All of these were case control studies.
2. In this table we report the result for all types of ovarian cancer combined, as reported by the authors.
3. For the Cook study the metric was the number of days on which the woman had ever applied the powder. For the other studies the metric is based on an estimate of the total number of applications.

4. RR or OR.
5. This study was based on a pooling of studies from 8 teams. Two of the teams (Cramer 2016 and Rosenblatt 2011) published separate analyses of risk by cumulative number of applications. But these are not shown here because they are rendered redundant by the Terry 2013 pooled results.

Table 7. Relative risk estimates between subgroups defined by duration of use¹ and ovarian cancer², from various studies.

Author	Duration of use	Number exposed cases	RR ⁴	95% C.I.	
Chang 1997	<30	60	1.7	1.1	2.6
	30-40	71	1.4	1.0	2.2
	>40	41	0.9	0.5	1.4
Cramer 1999	<20 years	55	1.9	1.2	3.0
	20-30 years	32	1.3	0.8	2.3
	>30 years	59	1.4	0.9	2.3
Cramer 2016	< 8 years of use	133	1.31	1.03	1.68
	8-19 years of use	126	1.31	1.02	1.68
	20-35 years of use	147	1.35	1.07	1.70
	>35 years of use	129	1.33	1.03	1.71
Harlow 1992	<10 years	14	1.2	0.5	2.6
	10-29 years	49	1.6	1.0	2.7
	> 30 years	51	1.6	1.0	2.7
Houghton 2014	<9 years	135	1.09	0.88	1.36
	10+ years	97	1.02	0.80	1.30
Ness 2000	<1 year	17	2.0	1.0	4.0
	1-4 years	76	1.6	1.1	2.3
	5-9 years	40	1.1	0.8	1.9
	>10 years	233	1.2	1.0	1.5
Mills 2004	<3 years	18	1.0	0.6	1.8
	4-12 years	32	1.9	1.2	3.0
	13-30 years	29	1.5	0.9	2.3
	>30 years	21	1.2	0.7	2.1

Author	Duration of use	Number exposed cases	RR ⁴	95% C.I.	
Rosenblatt 2011	1-9 years	33	1.39	0.85	2.28
	10-19 years	29	1.46	0.87	2.45
	20-34 years	30	1.28	0.78	2.10
	35+ years	19	0.91	0.51	1.62
Schildkraut 2016	≤20 years	101	1.33	0.95	1.86
	>20 years	144	1.52	1.11	2.07
Whittemore 1988	1-9 years	34	1.6	1.0	2.6
	10+	50	1.1	0.7	1.7
Wong 1999	1-9 years	39	0.9	0.6	1.5
	10-19 years	49	1.4	0.9	2.2
	>20 years	101	0.9	0.6	1.2
Wu 2015	Per 5 years of exposure	1273	1.14	1.09	1.20

1. These were all studies that collected information on perineal use of hygiene powders in such a way as to allow construction of a measure of duration.
2. In this table we report the result for all types of ovarian cancer combined, as reported by the authors.
3. Years of case ascertainment or follow-up: For case-control studies this indicates the years in which cases were ascertained and data collected; for cohort studies it indicates the years of enrolment and follow-up.
4. RR or OR.

Table 8. Relative risk estimates between subgroups defined by measures of frequency of use¹ and ovarian cancer², from various studies.

Author	Frequency of use	Number exposed cases	RR ⁴	95% C.I.	
Booth 1989	Rarely	6	0.9	0.3	2.4
	Monthly	7	0.7	0.3	1.8
	Weekly	57	2.0	1.3	3.4
	Daily	71	1.3	0.8	1.9
Chang 1997	<10 per month	76	1.8	1.2	2.7
	10-25 per month	54	1.1	0.7	1.7
	Per 10 applications per month		0.9	0.7	1.1
Cramer 1999	<30 per month	64	2.2	1.4	3.6
	30-39 per month	59	1.7	0.8	1.8
	≥40 per month	23	1.7	0.8	3.1
Cramer 2016	1-7 days per month	220	1.17	0.96	1.44
	8-29 days per month	110	1.37	1.05	1.78
	>30 days per month	205	1.46	1.20	1.78
Gates 2008	<1 per week	18	0.98	0.54	1.79
	1-6 per week	22	1.01	0.57	1.79
	Daily	35	1.44	0.88	2.37
Harlow 1992	<5 per month	32	1.5	0.8	2.7
	5-29 per month	24	1.2	0.6	2.2
	≥30 per month	58	1.8	1.1	3.0

Author	Frequency of use	Number exposed cases	RR ⁴	95% C.I.	
Mills 2004	<1 per week	34	1.3	0.9	2.1
	1-3 per week	31	1.6	0.7	1.8
	4-7 per week	41	1.7	1.1	2.6
Schildkraut 2016	<Daily	88	1.12	0.80	1.58
	Daily	158	1.71	1.26	2.33
Whittemore 1988	1-20 per month	41	1.3	0.8	2.0
	>20 per month	44	1.5	0.9	2.2

1. These were all studies that collected information on perineal use of hygiene powders in such a way as to allow construction of a measure of frequency of use.
2. In this table we report the result for all types of ovarian cancer combined, as reported by the authors.
3. Years of case ascertainment or follow-up: For case-control studies this indicates the years in which cases were ascertained and data collected; for cohort studies it indicates the years of enrolment and follow-up.
4. RR or OR

Table 9. Relative risk estimates between ever regular use of talcum powder products¹ in the perineal area and invasive serous ovarian cancer, from various studies.

Author	Number exposed cases	RR ²	95% CI ³	
Cook 1997	71	1.7	1.1	2.5
Gates 2010	131 ⁴	1.06	0.84	1.35
Harlow 1992	60	1.4	0.9	2.2
Houghton 2014	105	1.13	0.84	1.51
Mills 2004	42	1.77	1.12	2.81
Schildkraut 2016	165	1.38	1.03	1.85
Terry 2013	1197	1.24	1.13	1.35
Wong 1999	136	1.2	0.7	2.1
Meta-analysis		1.25	1.15	1.36

p-value for heterogeneity 0.06

1. In all of these studies the exposure was defined as ever use of powder in the perineal area. In most studies it was further explicitly indicated that the use was regular.
2. RR or OR.
3. The confidence intervals are the ones reported by the authors of the respective studies. However in its implementation procedures, the Comprehensive Meta-analysis package recomputes them to be symmetric around the point estimate, on a log scale. Consequently, in the printout of the forest plot of meta-analyses, the printed confidence interval is not always identical to the one shown in this table.
4. Estimated based on Table 1 of Gates 2010.

Table 10. Some major misconceptions in reviewing evidence on talc and ovarian cancer

1. Cohort studies are more valid and informative than case-control studies.
2. Hospital-based case-control studies are more valid and informative than the population-based case-control studies.
3. Counting the number of “statistically significant” results is a valid way of assessing the consistency of results among multiple studies.
4. If a product has been used for a long time, it must be safe
5. You cannot prove causality with an RR less than 2.0.
6. Government agencies provide a reliable up-to-date source of scientific information.
7. A biological mechanism must be proven before we can establish causality
8. Bradford-Hill “aspects” represent a recipe list of necessary ingredients.

Table 11. Selected examples of some of the recognized causal associations that have RR less than 2.0

Agent	Disease	Approximate RR
Urban air pollution	Lung cancer	1.09 ¹
Trichloroethylene	Kidney cancer	1.32 ²
Diesel engine emissions	Lung cancer	1.42 ³
Benzene	Leukemia	1.72 ⁴
Domestic radon gas	Lung cancer	1.29 ⁵
Second hand cigarette smoke	Lung cancer	1.64
Intermittent intense sun exposure	Melanoma of the skin	1.61 ⁶
Estrogen-progestin menopausal therapy	Breast cancer	1.59 ⁷

¹ Hamra GB, Guha N, Cohen A, et al (2014). Outdoor Particulate Matter Exposure and Lung Cancer: A Systematic Review and Meta-Analysis, *Environ Health Perspect* 122:906-911.

² Karami S, Lan Q, Rothman N, et al (2012). Occupational trichloroethylene exposure and kidney cancer risk: a meta-analysis. *Occupational and Environmental Medicine* 69:858-867.

³ Mahjub H, Sadri G (2006). Meta-analysis of case-referent studies of specific environmental or occupational pollutants on lung cancer. *Indian Journal of Cancer* 43(4):169-173.

⁴ Khalade A, Jaakkola MS, Pukkala E, Jaakkola JJ (2010). Exposure to benzene at work and the risk of leukemia: a systematic review and meta-analysis. *Environmental Health* 9(31):1-8.

⁵ Zhang Z-L, Sun J, Dong J-Y, et al (2012). Residential Radon and Lung Cancer Risk: An Updated Meta-analysis of Case-control Studies. *Asian Pac J Cancer Prev* 13:2459-2465.

⁶ Gandini S, Sera F, Cattaruzza MS, et al (2004). Meta-analysis of risk factors for cutaneous melanoma: II. Sun exposure. *European Journal of Cancer* 41:45-60.

⁷ Kim S, Ko Y, Lee HJ, Lim J (2018). Menopausal hormone therapy and the risk of breast cancer by histological type and race: a meta-analysis of randomized controlled trials and cohort studies. *Breast Cancer Research and Treatment* 170(3):667-675.

Report on talcum powder use and ovarian cancer

Jack Siemiatycki

Cigarette smoking	Cardiovascular disease	1.6 ⁸
Physically inactive (compared with physically active) ⁹	Hypertension	1.19
	Diabetes	1.12
Low fruit and vegetable diet	Cardiovascular disease	1.09 ¹⁰

⁸ Doll R, Peto R, Boreham J, Sutherland I (2004). Mortality in relation to smoking: 50 years' observations on British male doctors, *British Medical Journal*, 328(7455):1519.

⁹ Carnethon MR, Gidding SS, Nehgme R, Sidney S, Jacobs, Jr DR, Liu K (2003). Cardiorespiratory Fitness in Young Adulthood and the Development of Cardiovascular Disease Risk Factors. *JAMA*, 290(23):3092–3100

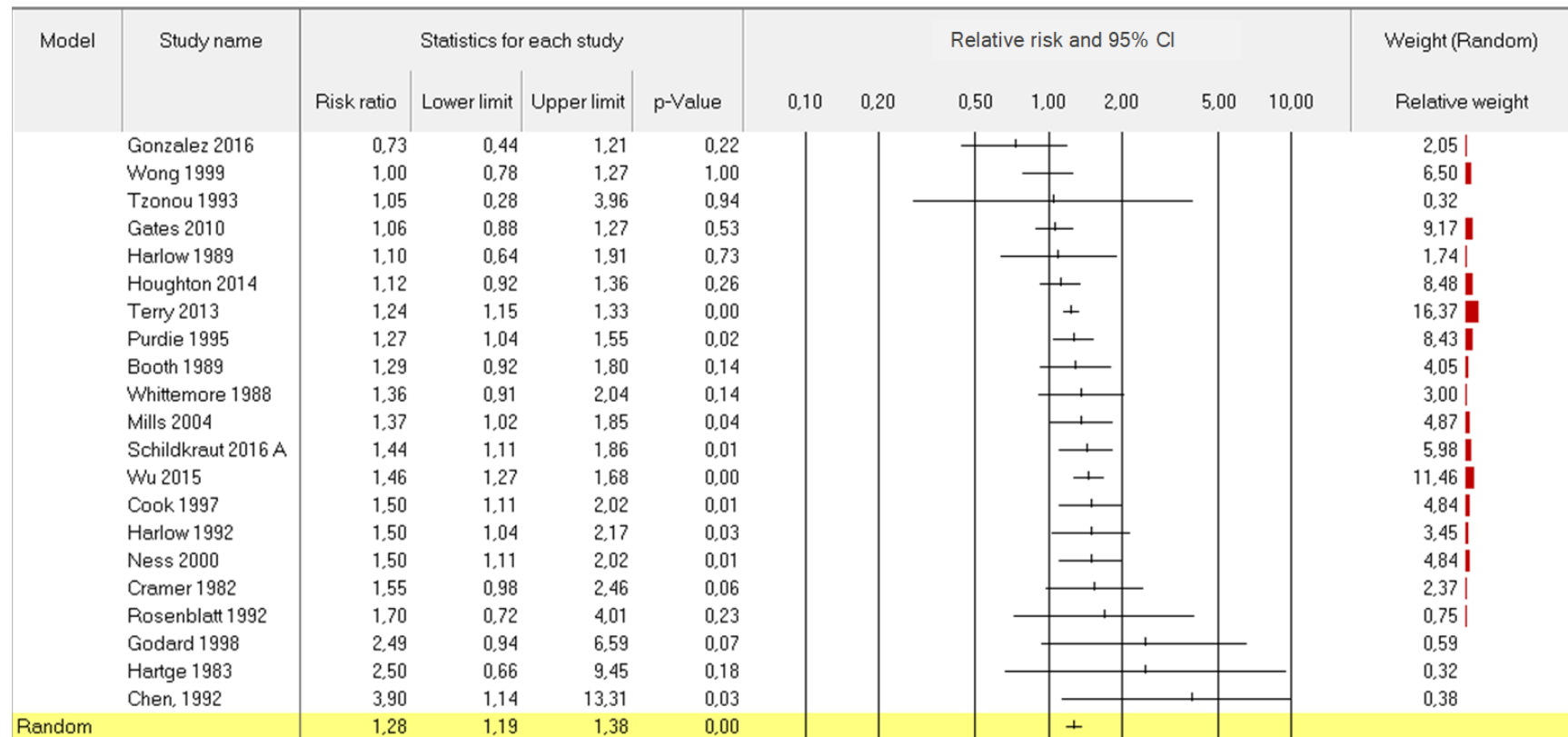
¹⁰ Aune D, Giovannucci E, Boffetta P, Fadnes L, Keum N, Norat T, Greenwood D, Riboli E, Vatten L, Tonstad S (2017). Fruit and vegetable intake and the risk of cardiovascular disease, total cancer and all-cause mortality – a systematic review and dose-response meta-analysis of prospective studies, *International Journal of Epidemiology* 43(3):1029-1056. (This RR estimate is computed from the reciprocal of the High fruit and vegetable variable that was reported by the authors. That is, 1/0.92).

Table 12. Bradford Hill aspects in relation to perineal talc exposure and ovarian cancer

Aspect	Brief comment	Weight in evaluating causality
Strength of the association	There are stronger associations and there are weaker associations	High
Dose response relationship	Reasonably clear increase in risk with increasing exposure	High
Consideration of alternative explanations – absence of bias	Yes considered, and none is compelling	High
Replication of the findings	Very strong, almost all studies support association	High
Temporal relationship	Exposure preceded disease in all studies	Moderate
Biological plausibility	There are plausible mechanisms	Moderate
Cessation of exposure	Not applicable.	Less
Specificity of the association	Yes, talc is not associated with a multitude of diseases	Less
Coherence with other knowledge	Could be similar to asbestos carcinogenicity	Less
Analogy		Less

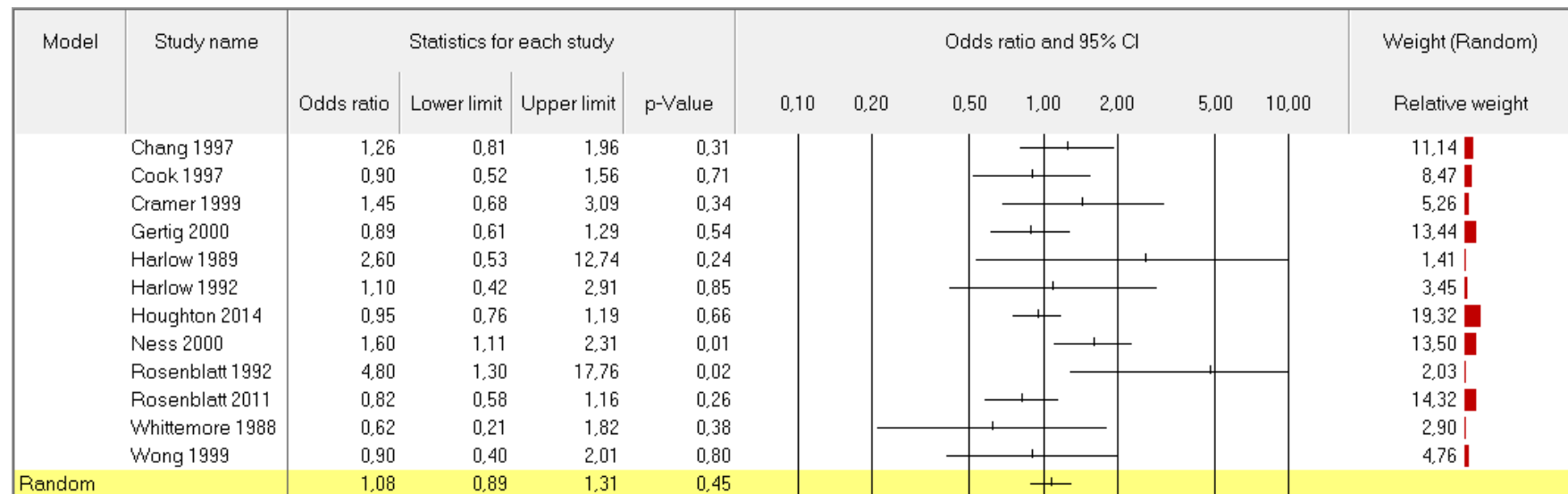
12. Figures

Figure 1. Meta-analysis of relative risk of ovarian cancer (all types combined) among women who regularly used talc powder in the perineal area, based on all informative studies, studies ordered by magnitude of RR.



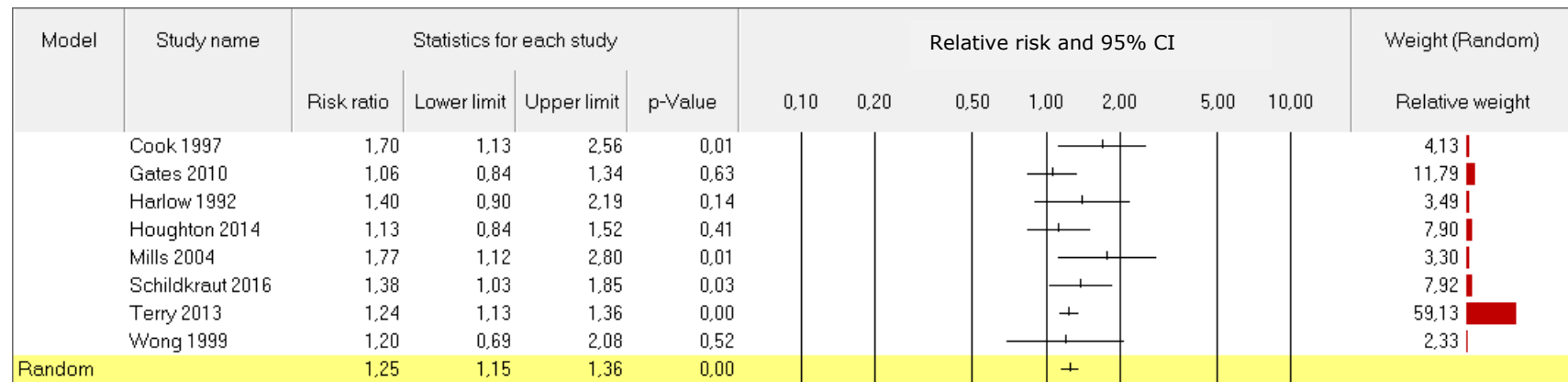
Model	Effect size and 95% interval				Test of null (2-Tail)		Heterogeneity				Tau-squared			
Model	Number Studies	Point estimate	Lower limit	Upper limit	Z-value	P-value	Q-value	df (Q)	P-value	I-squared	Tau Squared	Standard Error	Variance	Tau
Fixed	21	1.264	1.204	1.327	9.474	0.000	29.813	20	0.073	32.916	0.008	0.008	0.000	0.088
Random effects	21	1.280	1.186	1.381	6.364	0.000								

Figure 2. Meta-analysis of relative risk of ovarian cancer (all types combined) among women who regularly used talcum powder products on sanitary napkins, based on all informative studies.



Model	Effect size and 95% interval				Test of null (2-Tail)		Heterogeneity				Tau-squared			
Model	Number Studies	Point estimate	Lower limit	Upper limit	Z-value	P-value	Q-value	df (Q)	P-value	I-squared	Tau Squared	Standard Error	Variance	Tau
Fixed	12	1,041	0,911	1,189	0,591	0,554	17,614	11	0,091	37,551	0,037	0,045	0,002	0,193
Random effects	12	1,078	0,888	1,309	0,763	0,445								

Figure 3. Meta-analysis of relative risk of invasive serous ovarian cancer among women who regularly used talcum powder products in the perineal area, based on all informative studies



Model	Effect size and 95% interval				Test of null (2-Tail)		Heterogeneity				Tau-squared			
Model	Number Studies	Point estimate	Lower limit	Upper limit	Z-value	P-value	Q-value	df (Q)	P-value	I-squared	Tau Squared	Standard Error	Variance	Tau
Fixed	8	1,250	1,161	1,345	5,963	0,000	7,401	7	0,388	5,422	0,001	0,011	0,000	0,033
Random effects	8	1,254	1,152	1,364	5,249	0,000								

13. Appendix A

Appendix Table A1. Papers that contain some results on the association between exposure to perineal talc and ovarian cancer, and whether the paper was included in my meta-analyses of the binary Ever/Never exposed variable

Author	Included/excluded	Reasons for exclusion
Booth 1989	Core Inclusion	
Chang 1997	Core Inclusion	
Chen 1992	Core Inclusion	
Cook 1997	Core Inclusion	
Cramer 1982	Core Inclusion	
Cramer 1995	Excluded	Included in Terry 2013 and in Cramer 2016
Cramer 1999	Excluded	Included in Terry 2013 and in Cramer 2016
Cramer 2005	Excluded	Included in Terry 2013 and in Cramer 2016
Cramer 2016	Excluded when Terry 2013 is included	Considerable overlap between this and the Terry 2013 NEC component
Eltabbakh 1998	Excluded	Cases were peritoneal cancer and controls were ovarian cancer
Gates 2008 ²	Included in one sensitivity analysis	Overlap with Gates 2010

Author	Included/excluded	Reasons for exclusion
Gates 2010 ²	Included in all analyses except one sensitivity analysis	This may be a more complete analysis than Gates 2008, but the degree of overlap is unclear.
Gertig 2000	Excluded	Subsumed in Gates 2008 and Gates 2010
Godard 1998	Core inclusion	
Gonzalez 2016	Core inclusion	
Green 1997	Excluded	This appears to be an analysis of a subset of the subjects in Purdie 1995
Hankinson 1993	Excluded	Numerical results were not presented.
Harlow 1989	Core inclusion	
Harlow 1992	Core inclusion	
Hartge 1983	Core inclusion	
Houghton 2014	Core inclusion	
Jordan 2007	Excluded	Benign tumours only
Kurta 2012	Excluded	Included in Terry 2013
Langseth 2004	Excluded	Not based on perineal application of cosmetic powder.
Lo-Ciganic 2012	Excluded	Same study as Kurta 2012 and included in Terry 2013.
Merrit 2008	Excluded	Included in Terry 2013

Author	Included/excluded	Reasons for exclusion
Mills 2004	Core inclusion	
Moorman 2009	Excluded	Included in Terry 2013
Pike 2004	Excluded	Included in Terry 2013
Purdie 1995	Core inclusion	
Ness 2000	Core inclusion	
Rosenblatt 1992	Core inclusion	
Rosenblatt 2011	Core inclusion	
Schildkraut 2016	Core inclusion	
Shushan 1996	Included in sensitivity analysis	Unclear on how they obtained data on talc exposure or what the route of exposure was
Terry 2013	Included in Main analysis, but replaced by component studies in sensitivity analyses	
Tzonou 1983	Core inclusion	
Whittemore 1988	Core inclusion	
Wong 1999	Core inclusion	
Wu 2015	Core inclusion	

Appendix Table A2. Some administrative and contextual information on the studies used in the following tables

Author	Study location	Years of case ascertainment/ follow-up¹	Type of study
Booth 1989	London, Oxford UK	1978-1983	Case-control; Hospital controls
Chen 1992	Beijing Cancer Registry	1984-1986	Case-control; Population controls
Cook 1997	Washington State	1986-1988	Case-control; Population controls
Cramer 1982	Boston	1978-1981	Case-control; Population controls
Cramer 2016	New England	1992-2008	Case-control; Population controls
Gates 2008 ²	USA – NHS study	1976-2004	Case-control nested in Cohort (US nurses)
Gates 2010 ²	USA – pooled 2 cohorts of nurses NHS and NHSII	1976-2004 1989-2005	Cohort (US Nurses)
Godard 1998	Montreal, Canada	1995-1996	Case-control; Population controls
Gonzalez 2016	Puerto Rico and 11 States USA	2003-2014	Cohort
Harlow 1989	Washington State	1980-1985	Case-control; Population controls
Harlow 1992	Boston	1984-1987	Case-control; Population controls

Author	Study location	Years of case ascertainment/ follow-up¹	Type of study
Hartge 1983	Washington, DC	1974-77	Case-control; Population controls
Houghton 2014	USA	1993-2012	Cohort (WHI)
Mills 2004	California	2000-2001	Case-control; Population controls
Ness 2000	Pennsylvania, New Jersey, Delaware	1994-1998	Case-control; Population controls
Purdie 1995	Australia	1990-1993	Case-control; Population controls
Rosenblatt 1992	Baltimore	1981-1985	Case-control; Hospital controls
Schildkraut 2016	USA	2010-2015	Case-control; Population controls
Shushan 1996	Israel	1990-1993	Case-control Population controls
Terry 2013	Pooled 8 studies: USA & Australia	1984-2008	Case-control; Population controls
Terry-AUS 2013	Australia	2002-2006	Case-control Population controls
Terry – DOV ³ 2013	Washington State	2002-2009	Case-control Population controls
Terry – HAW 2013	Hawaii	1993-2008	Case-control Population controls

Author	Study location	Years of case ascertainment/ follow-up¹	Type of study
Terry – HOP 2013	Pennsylvania, Ohio, Western NY State	2003-2008	Case-control Population controls
Terry – NCO 2013	North Carolina	1999-2008	Case-control Population controls
Terry – NEC 2013	Massachusetts, New Hampshire	1992-2006	Case-control Population controls
Terry – SON 2013	Southern Ontario	1989-1992	Case-control Population controls
Terry – USC 2013	Los Angeles County	1992-1998	Case-control Population controls
Tzonou 1983	Athens	1989-1991	Case-control; Controls – hospital visitors
Whittemore 1988	San Francisco	1983-1985	Case-control; Hospital & population controls
Wong 1999	Buffalo	1982-1992	Case-control; Hospital controls
Wu 2015	Los Angeles County	1992-2008	Case-control; Population controls
1.	Years of case ascertainment or follow-up: For case-control studies this indicates the years in which cases were ascertained and data collected; for cohort studies it indicates the years of enrolment and follow-up.		
2.	The Gates 2008 and Gates 2010 papers are both derived from the U.S. Nurses Cohort. The latter represent results for all cases diagnosed up to 2006 and analysed in the cohort framework. The former represents results for a sub-set of cases that were selected for a nested c-c analysis. The number of exposed cases was not given in the Gates 2010 paper.		
3.	Terry – DOV 2013: the information in Terry 2013 is updated information included in Rosenblatt 2011.		

Appendix Table A3. Covariates used in the analyses and exposure variables in the studies used in the following tables.

Author	Exposure variable selected	Covariates used in analysis
Booth 1989	At least monthly use	Since the authors did not present results for “ever” exposed, I calculated the OR from crude numbers in their tables. Therefore the OR presented is a crude one. However, results presented in Table 7 adjusted for age and social class
Chen 1992	Dusting perineum or lower abdomen > 3 months	Education
Cook 1997	Lifetime perineal application	Age
Cramer 1982	Any use as dusting powder and/or on sanitary napkins	Parity; menopausal status
Cramer 2016	Any talc use	Age; study center (MA, NH); BMI; primary relative with breast or ovarian cancer; parity; OC use; tubal ligation
Gates 2008 ¹	Regular genital talc use (1 per week or more)	Age; OC ² use; parity; BMI; post-menopausal hormone use
Gates 2010 ¹	Regular genital talc use (1 per week or more)	Age; BMI; physical activity; smoking; family history of breast or ovarian ca; OC use; tubal ligation; hysterectomy; age menopause; estrogen use
Godard 1998	Ever use of talc on perineum	Age; reproductive factors; OC use; tubal ligation; alcohol use; breast and abdominal surgery
Gonzalez 2016	Talc use in the past 12 months	Race; body mass index; parity; duration of oral contraceptive use; baseline menopause status; and patency

Author	Exposure variable selected	Covariates used in analysis
Harlow 1989	Any genital talc use	Age; county; parity; OC use
Harlow 1992	Any genital talc use	Age; county; parity; marital status; education; religion; weight; use of sanitary napkins; douching
Hartge 1983	Any genital talc use	Race; age; gravidity
Houghton 2014	Combined use: longest duration of use among the applications to genitals, sanitary napkins and diaphragms	Age; race; OC use; HRT ³ use; family history of ovarian ca; age at last birth; BMI; smoking; tubal ligation; parity
Mills 2004	Ever use of talcum powder in genital area	Age; race/ethnicity; OC use; breast-feeding
Ness 2000	Genital rectal talc use	Age; parity; family history of ovarian ca;
Purdie 1995	Ever used talc in perineal region	Age; parity; duration of OC use; education; BMI; smoking; family history of ovarian ca
Rosenblatt 1992	Ever use of bath talc	Number of live births
Schildkraut 2016	Regular use of talc, cornstarch, baby or deodorising powder – at least once a month for 6 months	Age at diagnosis/interview; study site; education; tubal ligation; parity; BMI duration of OC use first degree family history of breast or ovarian cancer; and interview year
Shushan 1996	Talc use – never, seldom, moderate, a lot	Crude OR

Author	Exposure variable selected	Covariates used in analysis
Terry 2013 – all components of the pooled analysis	Genital powder use	Age; OC use; parity; BMI; tubal ligation; ethnicity; race; tubal ligation; hysterectomy; breastfeeding
Tzonou 1983	Ever use of talc in perineal region	Age; years of schooling; weight before onset of the disease; age at menarche; menopausal status and age at menopause; parity and age at first birth; tobacco smoking; coffee drinking; consumption of alcoholic beverages; hair dyeing; use of analgesics and tranquilizers/hypnotics
Whittemore 1988	Talcum powder used on any two of perineum, sanitary pads and diaphragm	Age; race; hospital; parity
Wong 1999	Ever use of talc on genital region or thighs	Age; income; education; geographic location; OC use; smoking; family history of ovarian ca; age at menarche; menopausal status; tubal ligation or hysterectomy
Wu 2015	Genital talc use >1 year	Age; race/ethnicity; interviewer; reproductive variables; sociodemographic variables; medical history; hormonal variables; BMI.
1.	The Gates 2008 and Gates 2010 papers are both derived from the U.S. Nurses Cohort. The latter represent results for all cases diagnosed up to 2006 and analysed in the cohort framework. The former represents results for a sub-set of cases that were selected for a nested c-c analysis. The number of exposed cases was not given in the Gates 2010 paper.	
2.	OC: oral contraceptive	
3.	HRT: hormone replacement therapy	

14. Appendix B

Comparison of studies used and results extracted from articles referenced in three different meta-analyses.*

Penninkilampi 2018 Study / RR(95%CI)	Berge 2018 Study / RR(95%CI)	Siemiatycki 2018 Study / RR(95%CI)
Booth 1989 1.30 (0.94-1.80)	<i>Booth 1989</i> <i>1.29 (0.92 - 1.80)</i>	<i>Booth 1989</i> <i>1.29 (0.92 - 1.80)</i>
Chang 1997 1.42 (1.08 – 1.86)	Chang 1997 1.35 (1.03 - 1.76)	
Chen, 1992 3.90 (1.43 – 10.60)	<i>Chen, 1992</i> <i>3.90 (0.91 - 10.60)</i>	<i>Chen, 1992</i> <i>3.90 (0.91 - 10.60)</i>
<i>Cook 1997</i> <i>1.50 (1.11 – 2.02)</i>	<i>Cook 1997</i> <i>1.50 (1.10 - 2.00)</i>	<i>Cook 1997</i> <i>1.50 (1.10 - 2.00)</i>
Cramer 1982 1.60 (1.21 – 2.12)	<i>Cramer 1982</i> <i>1.92 (1.27 - 2.89)</i>	<i>Cramer 1982</i> <i>1.92 (1.27 - 2.89)</i>
Cramer 2016 1.42 (1.03 – 1.95)	Cramer 2016 1.32 (1.14 - 1.50)	Cramer 2016 1.33 (1.16 – 1.52)
		Gates 2008 1.24 (0.83 - 1.83)
	<i>Gates 2010</i> <i>1.06 (0.89 - 1.28)</i>	<i>Gates 2010</i> <i>1.06 (0.89 - 1.28)</i>
Gertig 2000 1.09 (0.86 – 1.38)		

Penninkilampi 2018	Berge 2018	Siemiatycki 2018
Study / RR(95%CI)	Study / RR(95%CI)	Study / RR(95%CI)
<i>Godard 1998</i> 2.49 (0.94 - 6.58)	<i>Godard 1998</i> 2.49 (0.94 - 6.58)	<i>Godard 1998</i> 2.49 (0.94 - 6.58)
<i>Gonzalez 2016</i> 0.73 (0.44 - 1.20)	<i>Gonzalez 2016</i> 0.73 (0.44 - 1.20)	<i>Gonzalez 2016</i> 0.73 (0.44 - 1.20)
	Goodman 2008 0.99 (0.7 - 1.41)	
Green 1997 1.30 (1.06 - 1.60)		
Harlow 1989 1.10 (0.58 - 2.10)	<i>Harlow 1989</i> 1.10 (0.70 - 2.10)	<i>Harlow 1989</i> 1.10 (0.70 - 2.10)
	<i>Harlow 1992</i> 1.50 (1.00 - 2.10)	<i>Harlow 1992</i> 1.50 (1.00 - 2.10)
<i>Hartge 1983</i> 2.50 (0.66 - 9.45)	<i>Hartge 1983</i> 2.50 (0.70 - 10.00)	Hartge 1983 0.70 (0.40 - 1.10)
<i>Houghton 2014</i> 1.12 (0.92 - 1.36)	Houghton 2014 1.06 (0.87 - 1.28)	<i>Houghton 2014</i> 1.12 (0.92 - 1.36)
Kurta 2012 1.40 (1.16 - 1.69)		
	Lo-Ciganic 2012 1.34 (1.07 - 1.66)	

Penninkilampi 2018	Berge 2018	Siemiatycki 2018
Study / RR(95%CI)	Study / RR(95%CI)	Study / RR(95%CI)
Merritt 2008 1.17 (1.01 – 1.36)	Merritt 2008 1.13 (0.92 - 1.38)	
Mills 2004 1.37 (1.02 - 1.85)	Mills 2004 1.37 (1.02 - 1.85)	Mills 2004 1.37 (1.02 - 1.85)
	Moorman 2009 1.37 (1.05 - 1.8)	
Ness 2000 1.50 (1.10 - 2.02)	Ness 2000 1.50 (1.10 - 2.00)	Ness 2000 1.50 (1.10 - 2.00)
Purdie 1995 1.27 (1.04 - 1.54)	Purdie 1995 1.27 (1.04 - 1.54)	Purdie 1995 1.27 (1.04 - 1.54)
Rosenblatt 1992 1.70 (0.72 – 4.01)	Rosenblatt 1992 1.70 (0.70 - 3.90)	Rosenblatt 1992 1.70 (0.70 - 3.90)
Rosenblatt 2011 1.27 (0.97 – 1.66)	Rosenblatt 2011 1.13 (0.93 - 1.36)	
Schildkraut 2016 1.44 (1.11 - 1.86)	Schildkraut 2016 1.44 (1.11 - 1.86)	Schildkraut 2016 A 1.44 (1.11 - 1.86)
		Schildkraut 2016 B 1.19 (0.87 - 1.63)
Shushan 1996 2.00 (1.11 – 3.60)		Shushan 1996 1.97 (1.06 – 3.66)

Penninkilampi 2018	Berge 2018	Siemiatycki 2018
Study / RR(95%CI)	Study / RR(95%CI)	Study / RR(95%CI)
		Terry 2013 1.24 (1.15 - 1.33)
<i>Tzonou 1993</i> <i>1.05 (0.28 - 3.96)</i>	<i>Tzonou 1993</i> <i>1.05 (0.28 - 3.98)</i>	<i>Tzonou 1993</i> <i>1.05 (0.28 - 3.98)</i>
Whittemore 1988 1.40 (0.98 – 2.00)	<i>Whittemore 1988</i> <i>1.36 (0.91 - 2.04)</i>	<i>Whittemore 1988</i> <i>1.36 (0.91 - 2.04)</i>
Wong 1999 0.92 (0.24 – 3.57)	<i>Wong 1999</i> <i>1.00 (0.80 - 1.30)</i>	<i>Wong 1999</i> <i>1.00 (0.80 - 1.30)</i>
Wu 2015 1.32 (1.14 – 1.52)	<i>Wu 2015</i> <i>1.46 (1.27 - 1.69)</i>	<i>Wu 2015</i> <i>1.46 (1.27 - 1.69)</i>

- * When two or three of the meta-analyses extracted the identical results from the source paper, it is indicated with italic characters.

15. Appendix C

Examples of historic discoveries made on the basis of empirical observation of an association, without the existence of a validated biological mechanism of action.

- Jenner (18th century) discovered that smallpox could be prevented by “vaccinating” people. This was based on observation of the effect of exposure to cowpox. He had no idea about viruses or the biology of smallpox. He only knew that the “association” he observed between vaccination and the prevention of smallpox was so strong as to convince him it was causal. Millions of lives were saved as a result.
- Snow (19th century) discovered that cholera was caused by something in the water supply. He did not know what the pathogen was or how it produced the disease, but he showed with sufficient epidemiologic proof that drinking water from a polluted source produced much higher rates than drinking water from a clean source. Despite the ignorance of biological mechanisms, the public health authorities acted on his findings and thereby greatly reduced the incidence of cholera.
- Rheumatic fever and rheumatic heart disease were quite common causes of disease and death, striking relatively young people. For many decades it was recognized that there was an association between infection with the streptococcus bacterium and rheumatic heart disease, but it was not understood how the bacterium could have such an effect. The lack of understanding of the biological mechanisms did not get in the way of prevention of rheumatic heart disease by preventing and treating streptococcus infection.
- In the 1930’s and 1940’s, it was noticed that communities with high natural levels of fluoride in the water had much lower levels of dental caries than communities with low fluoride levels. Additional observational research confirmed the clear causal relationship and this led to extensive use of fluoride in various ways to reduce dental disease. But, all this occurred

before the mechanisms by which fluoride acted on teeth were understood. And, indeed the mechanisms are still not fully understood.

- In the late 1940's and early 1950's, evidence was accumulating that cigarette smokers had higher rates of lung cancer than non-smokers. This "association" was ridiculed at the time, among other reasons, because there was no proven biological mechanism. Attempts to replicate smoking-related lung cancer incidence in laboratory animals were largely unsuccessful. Nor was there a deep understanding of the cellular processes that allow the inhalation of cigarette smoke to culminate in a tumor. Scores of studies later and many decades later, the outlines of a credible biological mechanism began to emerge. The absence of a proven biological mechanism did not hinder the US Surgeon General and other national bodies from concluding that there was a causal link as early as the 1960's.
- Many chemicals have been found to be carcinogenic as a result of epidemiologic studies among workers. Examples of these are asbestos, silica, nickel compounds, chromium compounds, benzene, and others. Some of these discoveries go back to the first half of the 20th century, and, for most of them, many decades passed between the time they were recognized as carcinogens, on the basis of epidemiologic associations, and the elaboration of credible mechanisms of how they induce cancer. (Siemiatycki 2015) Most known carcinogens were first discovered empirically by medical doctors or epidemiologists, usually as part of large data collection activities or just plain astute observation on the part of medical doctors.

16. References

Bibliography Part A: Documents available in the Public Domain

Anderson E, P Sheehan, R Kalmes, J Griffin (2017). Assessment of health risk from historical use of cosmetic talcum powder, *Risk Analysis* 37(5):918-929.

Aune D, Giovannucci E, Boffetta P, Fadnes L, Keum N, Norat T, Greenwood D, Riboli E, Vatten L, Tonstad S (2017). Fruit and vegetable intake and the risk of cardiovascular disease, total cancer and all-cause mortality – a systematic review and dose-response meta-analysis of prospective studies, *International Journal of Epidemiology* 43(3):1029-1056.

Begg, March (2018). Cause and association: missing the forest for the trees. *American Journal of Public Health (AJPH)* Vol 108, No.5.

Berge, Mundt, Luu and Boffetta (2017, published 2018). Genital use of talc and risk of ovarian cancer: a meta-analysis. *The European Journal of Cancer Prevention* 27(3): 248-257.

Booth, M., V. Beral and P. Smith (1989). Risk factors for ovarian cancer: a case-control study. *British Journal of Cancer* 60(4): 592-598.

Blount A. (1991). Amphibole content of cosmetic and pharmaceutical talcs, *Environmental Health Perspectives*, 94:225-230.

Boffetta, Hayes, Satori, et al. (2016) Mouthwash use and cancer of the head and neck: a pooled analysis from the International Head and Neck Cancer Epidemiology Consortium. *The European Journal of Cancer Prevention* 25(4): 344-8.

Boorman G, J Seely (1995). The lack of ovarian effect of lifetime talc exposure in F344/N rats and B6C3F1 mice, *Regulatory Toxicology and Pharmacology* 21:242-243.

Booth, M., V. Beral and P. Smith (1989). Risk factors for ovarian cancer: a case-control study. *British Journal of Cancer* 60(4): 592-598.

Bunderson-Schelvan M, J Pfau, R Crouch, A Holian (2011). Nonpulmonary outcomes of asbestos exposure, *Journal of Toxicology and Environmental Health, Part B* 14:122-152.

- Buz'Zard, Lau (2007). Pycnogenol reduces talc-induced neoplastic transformation in human ovarian cell cultures. *Phytotherapy Research Journal* 21(6):579-86.
- Camargo M, L Stayner, K Straif, M Reina, U Al-Alem, P Demers, P Landrigan (2011). Occupational exposure to asbestos and ovarian cancer: a meta-analysis, *Environ Health Perspect* 119:1211–1217.
- Carnethon MR, Gidding SS, Nehgme R, Sidney S, Jacobs, Jr DR, Liu K (2003). Cardiorespiratory Fitness in Young Adulthood and the Development of Cardiovascular Disease Risk Factors. *JAMA*, 290(23):3092–3100.
- Carr CJ (1995). Talc: Consumer Uses and Health Perspectives, *Regulatory Toxicology and Pharmacology* 21:211-215.
- Cerhan, J., Z. Fredericksen, A. Wang, T. Habermann, N. Kay, W. Macon, J. Cunningham, T. Shanafelt, S. Answell, T. Call, T. Witzig, S. Slager, M. Liebow (2011). Design and validity of a clinic-based case-control study on the molecular epidemiology of lymphoma. *International Journal of Molecular Epidemiology and Genetics* 2(2): 95-113.
- Chang, S. and H. A. Risch (1997). Perineal talc exposure and risk of ovarian carcinoma. *Cancer* 79(12): 2396-2401.
- Chen, Y., P. C. Wu, J. H. Lang, W. J. Ge, P. Hartge and L. A. Brinton (1992). Risk factors for epithelial ovarian cancer in Beijing, China. *International Journal of Epidemiology* 21(1): 23-29.
- CIR (2013). *Safety Assessment of Talc as Used in Cosmetics*. Washington, D.C., CIR (Cosmetic Ingredient Review).
- Cook, L. S., M. L. Kamb and N. S. Weiss (1997). Perineal powder exposure and the risk of ovarian cancer. *American Journal of Epidemiology* 145(5): 459-465.
- Coussens, L. M. and Z. Werb (2002). Inflammation and cancer. *Nature* 420(6917): 860-867.
- Cralley L, M Key, D Groth, W Lainhart, R Ligo. (1968). Fibrous and mineral content of cosmetic talcum products, *American Industrial Hygiene Association Journal*, 29(4):350-354.

- Cramer, D. W. (2015). Opinion on the Relationship between Ovarian Cancer and Cosmetic Talc Powder Use: Causality and Relevance to the Case of Michael Blaes OBO Shawn Blaes. Civil Action Number 4:14-cv-00213. Unpublished report.
- Cramer, D. W., R. F. Liberman, L. Titus-Ernstoff, W. R. Welch, E. R. Greenberg, J. A. Baron and B. L. Harlow (1999). Genital talc exposure and risk of ovarian cancer. *International Journal of Cancer* 81(3): 351-356.
- Cramer, D. W., L. Titus-Ernstoff, J. R. McKolanis, W. R. Welch, A. F. Vitonis, R. S. Berkowitz and O. J. Finn (2005). Conditions Associated with Antibodies Against the Tumor-Associated Antigen MUC1 and Their Relationship to Risk for Ovarian Cancer. *Cancer Epidemiology, Biomarkers & Prevention* 14(5): 1125-1131.
- Cramer, D. W., A. F. Vitonis, K. L. Terry, W. R. Welch and L. J. Titus (2016). The Association Between Talc Use and Ovarian Cancer: A Retrospective Case-Control Study in Two US States. *Epidemiology* 27(3): 334-346.
- Cramer, D. W., W. R. Welch, R. S. Berkowitz and J. J. Godleski (2007). Presence of talc in pelvic lymph nodes of a woman with ovarian cancer and long-term genital exposure to cosmetic talc. *Obstetrics & Gynecology* 110(2 Part 2): 498-501.
- Cramer, D. W., W. R. Welch, R. E. Scully and C. A. Wojciechowski (1982). Ovarian cancer and talc: a case-control study. *Cancer* 50(2): 372-376.
- Cramer, D. W. and H. Xu (1995). Epidemiologic evidence for uterine growth factors in the pathogenesis of ovarian cancer. *Annals of Epidemiology* 5(4): 310-314.
- Current Intelligence Bulletin 62 (Rev/ 4/2011)- Asbestos fibers and other elongate mineral particles: state of the science and roadmap for research. *National Institute for Occupational Safety and Health (NIOSH)* DHHS (NIOSH) Publication No. 2011-159
- Dement, Shuler, Zumwalde (1972). "Fiber exposure during use of baby powders" *National Institute for Occupational Safety and Health*, IWS 36-6: 1-13.
- Doll R, Peto R, Boreham J, Sutherland I (2004). Mortality in relation to smoking: 50 years' observations on British male doctors, *British Medical Journal*, 328(7455):1519.

- Egli G, M. Newton (1961). The transport of carbon particles in the human female reproductive tract, *Fertility and Sterility* 12(April):151-55.
- Eltabbakh, G. H., M. S. Piver, N. Natarajan and C. J. Mettlin (1998). Epidemiologic differences between women with extraovarian primary peritoneal carcinoma and women with epithelial ovarian cancer. *Obstetrics & Gynecology* 91(2): 254-259.
- Fedak K, A. Bernal, Z Capshaw, S Gross (2015). Applying the Bradford Hill criteria in the 21st Century: How data integration has changed causal inference in molecular epidemiology, *Emerging Themes in Epidemiology* 12(14)
<https://doi.org/10.1186/s12982-015-0037-14>
- Federal Judicial Center and National Research Council of the National Academies (2011). *Reference Manual on Scientific Evidence, Third Edition*. Washington, D.C., The National Academies Press.
- Federal Register (2016). Banned Devices; Powdered Surgeon's Gloves; Patient Examination Gloves, and Absorbable Powder for Lubricating a Surgeon Glove – powdered gloves. *Food and Drug Administration* 81FR 91722.
- Fletcher N, J Belotte, M Saed, I Memaj, M Diamond, R Morris, G Saed (2016). Specific point mutations in key redox enzymes are associated with chemoresistance in epithelial ovarian cancer, *Free Radical Biology and Medicine*, 102:122-132.
- Fletcher N, I Memaj, G Saed (2018). Talcum powder enhances oxidative stress in ovarian cancer cells – Abstract, *Reproductive Sciences*, 25(Supp. 1):214A.
- Fletcher N, G. Saed (2018). Talcum powder enhances cancer antigen 125 levels in ovarian cancer cells – Abstract, *Society for Reproductive Investigation* 65th Annual Scientific Meeting, LB-044.
- Fiume, M., I. Boyer, W. Bergfeld, D. Belsito, R. Hill, C. Klaassen, D. Liebler, J. Marks, Jr., R. Shank. T. Slaga, P. Synder, F.A. Andersen (2015). Safety Assessment of Talc as Used in Cosmetics. *International Journal of Toxicology* 34(Supplement I): 66S-129S.
- Folkins A, E Jarboe, J Hecht, M Muto and C Crum (2018). "Chapter 24 – Assessing pelvic epithelial cancer risk and intercepting early malignancy." In *Diagnostic Gynecologic*

- and Obstetric Pathology (Third Edition)*, 844-64. Philadelphia: Content Repository Only! <https://doi.org/10.1016/B978-0-323-44732-4.00024-8>.
- Gandini S, Sera F, Cattaruzza MS, et al (2004). Meta-analysis of risk factors for cutaneous melanoma: II. Sun exposure. *European Journal of Cancer* 41:45-60.
- Gates, M. A., B. A. Rosner, J. L. Hecht and S. S. Tworoger (2010). Risk factors for epithelial ovarian cancer by histologic subtype. *American Journal of Epidemiology* 171(1): 45-53.
- Gates, M. A., S. S. Tworoger, K. L. Terry, I. De Vivo, D. J. Hunter, S. E. Hankinson and D. W. Cramer (2009). Breast cancer susceptibility alleles and ovarian cancer risk in 2 study populations. *International Journal of Cancer* 124(3): 729-733.
- Gates, M. A., S. S. Tworoger, K. L. Terry, L. Titus-Ernstoff, B. Rosner, I. De Vivo, D. W. Cramer and S. E. Hankinson (2008). Talc use, variants of the GSTM1, GSTT1, and NAT2 genes, and risk of epithelial ovarian cancer. *Cancer Epidemiology, Biomarkers & Prevention* 17(9): 2436-2444.
- Gertig, D. M., D. J. Hunter, D. W. Cramer, G. A. Colditz, F. E. Speizer, W. C. Willett and S. E. Hankinson (2000). Prospective study of talc use and ovarian cancer. *Journal of the National Cancer Institute* 92(3): 249-252.
- Gloyne S (1935). Two cases of squamous carcinoma of the lung occurring in asbestosis, *Tubercle* (17)1: 5-10.
- Godard, B., W. D. Foulkes, D. Provencher, J. S. Brunet, P. N. Tonin, A. M. Mes-Masson, S. A. Narod and P. Ghadirian (1998). Risk factors for familial and sporadic ovarian cancer among French Canadians: a case-control study. *American Journal of Obstetrics & Gynecology* 179(2): 403-410.
- Gonzalez, N. L., K. M. O'Brien, A. A. D'Aloisio, D. P. Sandler and C. R. Weinberg (2016). Douching, Talc Use, and Risk of Ovarian Cancer. *Epidemiology* 20: 20.
- Goodman, M. T., G. Lurie, P. J. Thompson, K. E. McDuffie and M. E. Carney (2008). Association of two common single-nucleotide polymorphisms in the CYP19A1 locus and ovarian cancer risk. *Endocrine-Related Cancer* 15(4): 1055-1060.

- Gordon R, S Fitzgerald, and J Millette (2014). Asbestos in commercial cosmetic talcum powder as a cause of mesothelioma in women, *International Journal of Occupational and Environmental Health*, 20(4): 318-332.
- Green, A., D. Purdie, C. Bain, V. Siskind, P. Russell, M. Quinn and B. Ward (1997). Tubal sterilisation, hysterectomy and decreased risk of ovarian cancer. Survey of Women's Health Study Group. *International Journal of Cancer* 71(6): 948-951.
- Grivennikov, S. I., F. R. Greten and M. Karin (2010). Immunity, inflammation, and cancer. *Cell* 140(6): 883-899.
- Gross, A. J. and P. H. Berg (1995). A meta-analytical approach examining the potential relationship between talc exposure and ovarian cancer. *Journal of Exposure Analysis & Environmental Epidemiology* 5(2): 181-195.
- Hamilton T, H Fox H, C Buckley CH, W Henderson, K Griffiths. Effects of talc on the rat ovary. *British journal of experimental pathology*. 1984;65(1):101-6Hamra GB, Guha N, Cohen A, et al (2014). Outdoor Particulate Matter Exposure and Lung Cancer: A Systematic Review and Meta-Analysis, *Environ Health Perspect* 122:906-911.
- Hankinson, S. E., D. J. Hunter, G. A. Colditz, W. C. Willett, M. J. Stampfer, B. Rosner, C. H. Hennekens and F. E. Speizer (1993). Tubal ligation, hysterectomy, and risk of ovarian cancer. A prospective study. *JAMA* 270(23): 2813-2818.
- Harlow, B. L., D. W. Cramer, D. A. Bell and W. R. Welch (1992). Perineal exposure to talc and ovarian cancer risk. *Obstetrics & Gynecology* 80(1): 19-26.
- Harlow, B. L. and N. S. Weiss (1989). A case-control study of borderline ovarian tumors: the influence of perineal exposure to talc. *American Journal of Epidemiology* 130(2): 390-394.
- Harper A, G Saed (2018). Talc induces a pro-oxidant state in normal and ovarian cancer cells through gene point mutations in key redox enzymes - Abstract, *Society of Gynecologic Oncology*, in press.
- Hartge, P., R. Hoover, L. P. Leshner and L. McGowan (1983). Talc and ovarian cancer. *JAMA* 250(14): 1844.

Heath, David. (2016) "Philip Morris uses chemical industry consultants to perpetuate 'light cigarette' myth" – <https://www.publicintegrity.org/2016/05/04/19618/philip-morris-uses-chemical-industry-consultants-perpetuate-light-cigarette-myth>

Heller, D. S., C. Westhoff, R. E. Gordon and N. Katz (1996). The relationship between perineal cosmetic talc usage and ovarian talc particle burden. *American Journal of Obstetrics & Gynecology* 174(5): 1507-1510.

Hernan (2018). The C-Word: scientific euphemisms do not improve causal inference from observational data. *The American Journal of Public Health (AJPH)* Vol 108, No.5: 616-619

Henderson, W. J., T. C. Hamilton and K. Griffiths (1979). Talc in normal and malignant ovarian tissue. *Lancet* 1(8114): 499.

Henderson, W. J., C. A. Joslin, A. C. Turnbull and K. Griffiths (1971). Talc and carcinoma of the ovary and cervix. *Journal of Obstetrics & Gynaecology British Commonwealth* 78(3): 266-272.

Henderson, W.J., T.C. Hamilton, M.S. Baylis, C.G. Pierrepont, K. Griffiths (1986). The demonstration of the migration of talc from the vagina and posterior uterus to the ovary in the rat, *Environmental Research* 40:247-250.

Hill, A. B. (1965). The environment and disease: association or causation? *Proceedings of the Royal Society of Medicine* 58: 295-300.

Houghton, S. C., K. W. Reeves, S. E. Hankinson, L. Crawford, D. Lane, J. Wactawski-Wende, C. A. Thomson, J. K. Ockene and S. R. Sturgeon (2014). Perineal powder use and risk of ovarian cancer. *Journal of the National Cancer Institute* 106(9).

Huncharek, M., J. F. Geschwind and B. Kupelnick (2003). Perineal application of cosmetic talc and risk of invasive epithelial ovarian cancer: a meta-analysis of 11,933 subjects from sixteen observational studies. *Anticancer Research* 23(2C): 1955-1960.

Huncharek, M. and J. Muscat (2011). Perineal talc use and ovarian cancer risk: a case study of scientific standards in environmental epidemiology. *European Journal of Cancer Prevention* 20(6): 501-507.

Huncharek, M., J. Muscat, A. Onitilo and B. Kupelnick (2007). Use of cosmetic talc on contraceptive diaphragms and risk of ovarian cancer: a meta-analysis of nine observational studies. *European Journal of Cancer Prevention* 16(5): 422-429.

IARC Monograph 1-42 (1972-1987) - Evaluation of the Carcinogenic risk of chemicals to humans. *International Agency for Research on Cancer/World Health Organization*, WHO Press.

IARC (1996). *Mechanisms of mineral fibre carcinogenesis. Publication No, 140*. Kane AB, Boffeta P, Saracci R, Wilbourn JD, *IARC Scientific*

IARC (2010). *IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, Vol. 93. Carbon black, titanium dioxide, and talc*. Lyon, IARC (International Agency for Research on Cancer).

IARC (2011). *IARC Monographs on Design and validity of a clinic base control-study on the molecular epidemiology of lymphoma, Vol. 93*. James R. Cerhan, Zachary S. Fredericksen, Alice H Wang, Thomas M. Habermann, Neil E. Kay, William R. Macon, Julie M. Cunningham, Tait D. Shanfelt, Stephen M. Answell, Thimothy G. Call, Thomas E. Witzig, Susan L. Slager, Mark Liebow, IARC (International Agency for Research on Cancer).

IARC - Monograph Vol. 100C (2012)- Arsenic, Metals Fibres, and Dusts: A review of human carcinogens. Lyon, *International Agency for Research on Cancer/World Health Organization*.

Ioannidis J (2005). Why most published research findings are false, *PLoS Med*, 2(8):e124.

Ioannidis J (2015). Exposure-wide epidemiology: revisiting Bradford Hill, *Statistics in Medicine*

Jordan, S. J., A. C. Green, D. C. Whiteman, P. M. Webb and Australian Ovarian Cancer Study Group (2007). Risk factors for benign serous and mucinous epithelial ovarian tumors. *Obstetrics & Gynecology* 109(3): 647-654.

Karami S, Lan Q, Rothman N, et al (2012). Occupational trichloroethylene exposure and kidney cancer risk: a meta-analysis. *Occupational and Environmental Medicine* 69:858-867.

Kasper CS, Chandler PJ, Jr. Possible morbidity in women from talc on condoms. *JAMA*. 1995;273(11):846-7.

Khalade A, Jaakkola MS, Pukkala E, Jaakkola JJ (2010). Exposure to benzene at work and the risk of leukemia: a systematic review and meta-analysis. *Environmental Health* 9(31):1-8.

Kim S, Ko Y, Lee HJ, Lim J (2018). Menopausal hormone therapy and the risk of breast cancer by histological type and race: a meta-analysis of randomized controlled trials and cohort studies. *Breast Cancer Research and Treatment* 170(3):667-675.

Krause J (1977). Mineralogical characterization of cosmetic talc products, *Journal of Toxicology and Environmental Health* 2(5):1223-1226. Kurta, M. L., K. B. Moysich, J. L. Weissfeld, A. O. Youk, C. H. Bunker, R. P. Edwards, F. Modugno, R. B. Ness and B. Diergaarde (2012). Use of fertility drugs and risk of ovarian cancer: results from a U.S.-based case-control study. *Cancer Epidemiology, Biomarkers & Prevention* 21(8): 1282-1292.

Langseth, H., S. E. Hankinson, J. Siemiatycki and E. Weiderpass (2008). Perineal use of talc and risk of ovarian cancer. *Journal of Epidemiology & Community Health* 62(4): 358-360.

Langseth, H. and K. Kjaerheim (2004). Ovarian cancer and occupational exposure among pulp and paper employees in Norway. *Scandinavian Journal of Work, Environment & Health* 30(5): 356-361.

Last, J. M. (2001). *A Dictionary of Epidemiology, Fourth Edition*. Oxford, Oxford University Press.

Levin. "Baby powder battles: Johnson & Johnson internal documents reveal asbestos worries" - <https://www.fairwarning.org/2018/01/talc-documents-reveal/print>

- Licaj, Jacobsen, Selmer et al. (2017). Smoking and risk of ovarian cancer by histological subtypes: an analysis among 300,000 Norwegian women. *British Journal of Cancer* 116(2): 270-276
- Lo-Ciganic, W. H., J. C. Zgibor, C. H. Bunker, K. B. Moysich, R. P. Edwards and R. B. Ness (2012). Aspirin, nonaspirin nonsteroidal anti-inflammatory drugs, or acetaminophen and risk of ovarian cancer. *Epidemiology* 23(2): 311-319.
- Lockey J (1981). Nonasbestos fibrous minerals, *Clinics in Chest Medicine* 2(2):203-218.
- Lundin, Dossus, Clendenen, Krogh, Grankvist, Wulff, Sieri, Arlsan, Lenner, Berrino, Hallmans, Zeleniuch-Jacquotte, Toniolo, Lukanova (2009). C-reactive protein and ovarian cancer: a prospective study nested in three cohorts (Sweden, USA, Italy). *Cancer Causes & Control: CCC* 20(7):1151-1159.
- Lunet, N., and A. Azevedo (2009). Letter to the Editor: On the comparability of population-based and hospital-based case-control studies. *Gaceta Sanitaria* 23(6): 564-567.
- Mahjub H, Sadri G (2006). Meta-analysis of case-referent studies of specific environmental or occupational pollutants on lung cancer. *Indian Journal of Cancer* 43(4):169-173.
- Mallen, Townsend, Tworoger (2018). Risk factors for ovarian carcinoma. *Hematology/Oncology Clinics of North America*. 32(6):891-902.
- Masi, A. (1965). Potential uses and limitations of hospital data in epidemiologic research. *American Journal of Public Health* 55(5): 658-667.
- Mattenklott (2007). Asbestos in talc powders and soapstone – the present state . *Staub, Reinhaltung der Luft Journal* 67(7):287-292.
- Mayer D, C Kasper, P Chandler (1995). To the Editor: Talc and Condoms and reply, *JAMA* 274(16):1269.
- Merritt, M. A., A. C. Green, C. M. Nagle, P. M. Webb, Australian Cancer Study (Ovarian Cancer) and Australian Ovarian Cancer Study Group (2008). Talcum powder, chronic pelvic inflammation and NSAIDs in relation to risk of epithelial ovarian cancer. *International Journal of Cancer* 122(1): 170-176.

- Mills, P. K., D. G. Riordan, R. D. Cress and H. A. Young (2004). Perineal talc exposure and epithelial ovarian cancer risk in the Central Valley of California. *International Journal of Cancer* 112(3): 458-464.
- Miserocchi G, G Sancini, F Mantegazza, G Chiappino (2008). Translocation pathways for inhaled asbestos fibers, *Environmental Health* 7:4 doi: 10.1186/1476-069X-7-4.
- Moller P, P Danielsen, K Jantsen, M Roursgaard & S Loft (2013). Oxidatively damaged DNA in animals exposed to particles, *Critical Reviews in Toxicology*, 43:2, 96-118.
- Moller, Jacobsen et al (2010). Role of oxidative damage in toxicity of particulates, *Free Radical Researchm* 44:1, 1-46.
- Moon M, J Park, B Choi, S Park, D Kim, Y Chung, N Hisanaga, I Yu (2011). Risk assessment of baby powder exposure through inhalation. *Official Journal of Korean Society of Toxicology*, 27(3): 137-147.
- Moorman, P. G., R. T. Palmieri, L. Akushevich, A. Berchuck and J. M. Schildkraut (2009). Ovarian cancer risk factors in African-American and white women. *American Journal of Epidemiology* 170(5): 598-606.
- Muscat J.E., Huncharek M (2008). Perineal Talc Use and Ovarian Cancer: A Critical Review. *European J Cancer Prevention* 17:139-146.
- Narod S (2016). Talc and ovarian cancer. *Gynecologic Oncology* 141(3):410-12.
<https://doi.org/10.1016/j.ygyno.2016.04.011>.
- Ness, R. B. and C. Cottreau (1999). Possible role of ovarian epithelial inflammation in ovarian cancer. *Journal of the National Cancer Institute* 91(17): 1459-1467.
- Ness, R. B., J. A. Grisso, C. Cottreau, J. Klapper, R. Vergona, J. E. Wheeler, M. Morgan and J. J. Schlesselman (2000). Factors related to inflammation of the ovarian epithelium and risk of ovarian cancer. *Epidemiology* 11(2): 111-117.
- Ness, Roberta (2015)– Does talc exposure cause ovarian cancer?:IGCS-0015 Ovarian Cancer. *International Journal of Gynecological Cancer: Official Journal of the International Gynecological Cancer Society*, 25 Suppl. 1:51

Neupane, B., S. Walter, P. Krueger, M. Loeb (2010). Community controls were preferred to hospital controls in a case-control study where the cases are derived from the hospital. *Journal of Clinical Epidemiology* 63(8): 926-931.

Paoletti, Caiazza, et al (1984). Evaluation by electron microscopy techniques of asbestos contamination in industrial, cosmetic, and pharmaceutical talcs. *Regulatory Toxicology and Pharmacology* 4(3):222-35.

Park, Schildkraut, et al. (2018) Benign gynecologic conditions are associated with ovarian cancer risk in African-American women: a case-control study. *Cancer Causes & Control* Vol. 29, Issue 11, pp 1081-1091.

Peeples, Lynne (2014) "Hidden source of industry influence threatens toxic chemical regulations" – https://huffingtonpost.com/2014/09/18/industry-toxic-chemicals-funding-conflicts-of-interest_n_5837968.html

Pennikilampi R, G Eslick (2018). Perineal talc use and ovarian cancer: a systematic review and meta-analysis, *Epidemiology*, 29:41-49.

Petitti, D. B. (2000). *Meta-Analysis, Decision Analysis, and Cost-Effectiveness Analysis*. New York, Oxford University Press.

Pike, M. C., C. L. Pearce, R. Peters, W. Cozen, P. Wan and A. H. Wu (2004). Hormonal factors and the risk of invasive ovarian cancer: a population-based case-control study. *Fertility & Sterility* 82(1): 186-195.

Purdie, D., A. Green, C. Bain, V. Siskind, B. Ward, N. Hacker, M. Quinn, G. Wright, P. Russell and B. Susil (1995). Reproductive and other factors and risk of epithelial ovarian cancer: an Australian case-control study. Survey of Women's Health Study Group. *International Journal of Cancer* 62(6): 678-684.

Reid, Permuth, Sellers (2017). *Epidemiology of ovarian cancer: a review. Cancer Biology and Medicine* 14(1): 9-32.

VL Roggli, PC Pratt (1983). Numbers of asbestos bodies on iron-stained tissue sections in relation to asbestos body counts in lung tissue digest. *Human Pathology Journal* 14(4): 355-61.

VL Roggli, PC Pratt, AR Brody(1986). Asbestos content of lung tissue in asbestos associated diseases: a study of 110 cases. *British Journal of Industrial Medicine* 43(1): 18-28.

Rohl A (1974). Asbestos in Talc, *Environmental Health Perspectives*, 9:129-132.

Rohl A, A. Langer, J. Selikoff, A. Tordini, R. Klimentidis (1976). Consumer talcums and powders: mineral and chemical characterization. *Journal of Toxicology and Environmental Health* 2(2):255-84.

Rosenblatt, K. A., W. A. Mathews, J. R. Daling, L. F. Voigt and K. Malone (1998). Characteristics of women who use perineal powders. *Obstetrics & Gynecology* 92(5): 753-756.

Rosenblatt, K. A., M. Szklo and N. B. Rosenshein (1992). Mineral fiber exposure and the development of ovarian cancer. *Gynecologic Oncology* 45(1): 20-25.

Rosenblatt, K. A., N. S. Weiss, K. L. Cushing-Haugen, K. G. Wicklund and M. A. Rossing (2011). Genital powder exposure and the risk of epithelial ovarian cancer. *Cancer Causes & Control* 22(5): 737-742.

Ross, Malcom (1974)Geology, asbestos and health. *The National Institute of Environmental Health Sciences* 9:123-124

Rothan, Pastides, Samet (2000). Interpretation of epidemiologic studies on Talc and Ovarian Cancer.

Rothman, K. J. and S. Greenland (1998). *Modern Epidemiology, Second Edition*. Philadelphia, Lippincott-Raven Publishers.

Rothman, K., Greenland, S., & Lash, TL. (2008). *Modern Epidemiology, 3rd Edition*. Philadelphia, PA: Lippincott Williams & Wilkins.

Ruano-Ravina, A., M. Perez-Rios, J. Barros-Dios (2008). Population-based versus hospital-based controls: are they comparable? *Gaceta Sanitaria* 22(6): 609-613.

Saed G, R Morris, N Fletcher (2018). *New insights into the pathogenesis of ovarian cancer-oxidative stress, Ovarian Cancer – From Pathogenesis to Treatment*, Ch. 4, 83-110, IntechOpen.

- Saed G, M Diamond, N Fletcher (2017). Updates of the role of oxidative stress in the pathogenesis of ovarian cancer, *Gynecologic Oncology*, 145:595-602.
- Schildkraut, J. M., S. E. Abbott, A. J. Alberg, E. V. Bandera, J. S. Barnholtz-Sloan, M. L. Bondy, M. L. Cote, E. Funkhouser, L. C. Peres, E. S. Peters, A. G. Schwartz, P. Terry, S. Crankshaw, F. Camacho, F. Wang and P. G. Moorman (2016). Association between Body Powder Use and Ovarian Cancer: the African American Cancer Epidemiology Study (AACES). *Cancer Epidemiology, Biomarkers & Prevention* 12: 12.
- Shukla A, M MacPherson, J Hillegass, M Ramos-Nino, V Alexeeva, P Vacek, J Bond, H Pass, C Steele, B Mossman (2009). Alterations in gene expression in human mesothelial cells correlated with mineral pathogenicity, *American Journal of Respiratory Cell and Molecular Biology*, 41:114-123.
- Shushan, A., O. Paltiel, J. Iscovich, U. Elchalal, T. Peretz and J. G. Schenker (1996). Human menopausal gonadotropin and the risk of epithelial ovarian cancer. *Fertility & Sterility* 65(1): 13-18.
- Siemiatycki J. Historical overview of occupational cancer research and control. In Occupational Cancers. Eds S Anttila, P Boffetta, K Straif. Springer Press: 1-20, 2014.
- Sjosten A, H Ellis, G Edelstam (2004). Retrograde migration of glove powder in the human female genital tract, *Human Reproduction* 19(4):991-995.
- Smith, Guyton, Gibbons, et al. (2016). Key characteristics of carcinogens as a basis for organizing data on mechanisms of carcinogenesis. *Environmental Health Perspectives* 124(6):713-21
- Steiling W, Almeida JF, Assaf Vandecasteele H, Gilpin S, Kawamoto T, O'Keeffe L, Pappa G, Rettinger K, Rothe H, Bowden AM (2018) Principles for the safety evaluation of cosmetic powders, *Toxicology Letters*, 297, 8-18.
- Straif K, Benbrahim-Tallaa L, Baan R, Grosse Y, Secretan B, El Ghissassi F, Bouvard V, Guha N, Freeman C, Galichet L, Coglianò V; WHO International Agency for Research on Cancer Monograph Working Group (2009). A review of human carcinogens - Part C: metals, arsenic, dusts and fibres, *Lancet Oncology* 10(5):453-454. Suzuki Y, N

- Kohyama (1991). Translocation of inhaled asbestos fibers from the lung to other tissue, *American Journal of Industrial Medicine* 19(6):701-704.
- Terry, K. L., S. Karageorgi, Y. B. Shvetsov, M. A. Merritt, G. Lurie, P. J. Thompson, M. E. Carney, R. P. Weber, L. Akushevich, W. H. Lo-Ciganic, K. Cushing-Haugen, W. Sieh, K. Moysich, J. A. Doherty, C. M. Nagle, A. Berchuck, C. L. Pearce, M. Pike, R. B. Ness, P. M. Webb, M. A. Rossing, J. Schildkraut, H. Risch and M. T. Goodman (2013). Genital Powder Use and Risk of Ovarian Cancer: A Pooled Analysis of 8,525 Cases and 9,859 Controls. *Cancer Prevention Research* 6(8): 811-821.
- Trabert G, E Poole, E White, K Visvanathan, H Adami, G Anderson, T Brasky et al. (2018). Analgesic use and ovarian cancer risk: an analysis in the Ovarian Cancer Cohort Consortium, *Journal of the National Cancer Institute* 111(2)
<https://doi.org/10.1093/jnci/djy100>.
- Tung, Goodman, Wu, et al. (2005) Reproductive factors and epithelial ovarian cancer risk by histologic type: a multi-ethnic case-control study. *American Journal of Epidemiology* 161(4):321-9.
- Tung, Wilkes, Wu, et al. (2003). Effect of anovulation factors on pre-and postmenopausal ovarian cancer risk: revisiting the incessant ovulation hypothesis. *American Journal of Epidemiology* 158(7): 629-38
- Tzonou, A., A. Polychronopoulou, C. C. Hsieh, A. Rebelakos, A. Karakatsani and D. Trichopoulos (1993). Hair Dyes, Analgesics, Tranquilizers and Perineal Talc Application as Risk Factors for Ovarian Cancer. *International Journal of Cancer* 55(3): 408-410.
- U.S. Department of Health, E., and Welfare, (1964). *Smoking and Health: Report of the Advisory Committee to the Surgeon General of the Public Health Service*. Washington, D.C., U.S. Department of Health, Education, and Welfare.
- Van Gosen B, H Lowers, S Sutley, and C. Gent (2004). Using the geologic setting of talc deposits as an indicator of amphibole asbestos content, *Environmental Geology*, 45 (7):920-939.

Venter, P. F. and M. Iturralde (1979). Migration of a particulate radioactive tracer from the vagina to the peritoneal cavity and ovaries. *South African Medical Journal* 55(23): 917-919.

Virta, Robert L. (1985). The phrase relationship of talc and amphiboles in a fibrous talc sample. Vol. 8923 of the *U.S. Dept. of the Interior, Bureau of Mines– Science*.

Weed, D. L. (2000). Epidemiologic evidence and causal inference. *Hematological & Oncological Clinics of North America* 14(4): 797-807, viii.

Wehner A, A Hall, R Weller, E Lepel, R Schirmer (1985). Do particles translocate from the vagina to the oviducts and beyond? *Fd Chem. Toxic.* 23(3) :367-372.

Werner I (1982). Presence of asbestos in talc samples, *Atenschutzinformationen*, 21:5-7.

Wentzensen, N. and S. Wacholder (2014). Talc use and ovarian cancer: epidemiology between a rock and a hard place. *Journal of the National Cancer Institute* 106(9).

Whittemore, A. S., M. L. Wu, R. S. Paffenbarger, Jr., D. L. Sarles, J. B. Kampert, S. Grosser, D. L. Jung, S. Ballon and M. Hendrickson (1988). Personal and environmental characteristics related to epithelial ovarian cancer. II. Exposures to talcum powder, tobacco, alcohol, and coffee. *American Journal of Epidemiology* 128(6): 1228-1240.

Whysner, J. and M. Mohan (2000). Perineal application of talc and cornstarch powders: evaluation of ovarian cancer risk. *American Journal of Obstetrics & Gynecology* 182(3): 720-724.

Wong, C., R. E. Hempling, M. S. Piver, N. Natarajan and C. J. Mettlin (1999). Perineal talc exposure and subsequent epithelial ovarian cancer: a case-control study. *Obstetrics & Gynecology* 93(3): 372-376.

Wu, A. H., C. L. Pearce, et al. (2009). Markers of inflammation and risk of ovarian cancer in Los Angeles County. *International Journal of Cancer* 124(6): 1409-1415.

Wu AH, CL Pearce, CC Tseng, MC Pike (2015). African-Americans and Hispanics remain at lower risk of ovarian cancer than non-hispanic whites after considering nongenetic

risk factors and oophorectomy rates, *Cancer Epidemiol Biomarkers Prev* 24(7):1094-1100.

Wu S, W Zhu, P Thompson, Y Hannun (2018) Evaluating intrinsic and non-intrinsic cancer risk factors, *Nature Communications* 9(1):3490.

Zazenski R, W Ashton, D Briggs, M Chudkowski, J Kelse, L MacEachern, E McCarthy, M Nordhauser, M Roddy, N Teetsel, A Wells, S Gettings (1995). Talc: Occurrence, characterization and consumer applications, *Regulatory Toxicology and Pharmacology* 21:218-229.

Zhang Z-L, Sun J, Dong J-Y, et al (2012). Residential Radon and Lung Cancer Risk: An Updated Meta-analysis of Case-control Studies. *Asian Pac J Cancer Prev* 13:2459-2465.

Bibliography – Part B: Documents not available in the Public Domain

IMERYS044612

IMERYS049952-56

IMERYS051371-72

IMERYS051442

IMERYS089960

IMERYS091279-80

IMERYS111220

IMERYS126092-97

IMERYS138505-11

IMERYS179122-23

IMERYS210136-37

IMERYS219720-22

IMERYS239864

IMERYS2419940-04

IMERYS242050

IMERYS274896

IMERYS284935-37

IMERYS288001-04

IMERYS288590-91

IMERYS303801

IMERYS322241-42

IMERYS342524-25

IMERYS422289-90

IMERYS442232-33

IMERYS500801

IMERYS-A_0001304-09

IMERYS-A_0011817

IMERYS-A_0011964-65

IMERYS-A_0021921-29

IMERYS-A_0024367

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Report on talcum powder use and ovarian cancer

Jack Siemiatycki

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JNJ000075792-94

JNJ000085127-39

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JNJ000092918-20

JNJ000093405

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JNJ000239388

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JNJ000526231-6676

J&J-0007797

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LUZ005090-91

LUZ005109-10

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LUZ006507-09

LUZ010145-48

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LUZ012006-18

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LUZ015111-12

LUZ015663

LUZ020182-86

LUZ021921-29

LUZ022044-50

LUZ022207-08

LUZ023843-35

MBS-CRE Production of Documents 000240-41

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PCPC0052415

WCD000254-55

After your doctor or health care provider prescribes your ORTHO Diaphragm, 1998.

(JANSSEN000056-65)

Agenda: NTP Board of Scientific Counselors Report on Carcinogens (RoC) Subcommittee
Meeting

Annie Yessian Report - Echeverria

Berg v. Johnson & Johnson, Final Jury Instructions

Berg v. Johnson & Johnson, Judgment

Berg v. Johnson & Johnson, Verdict Form October 4, 2013

California State Cosmetics Program from the California Dept of Public Health - Occupational
health Branch - Chemicals known or suspected to cause cancer or reproductive
toxicity (P-31)

California Safe Cosmetics Act 2005

Carl v. J&J; Balderrama v. J&J - Defendants Johnson & Johnson, Johnson & Johnson Consumer Inc., and Imerys Talc America, Inc's joint memorandum of law in support of their motion to exclude plaintiffs' experts' general causation opinions

Cancer Prevention Coalition – November 17, 1994 Citizen's Petition to FDA seeking carcinogenic labelling on all cosmetic talc products

Cancer Prevention Coalition – May 13, 2008 Citizen's Petition to FDA seeking a cancer warning on cosmetic talc products

Cesario, S - Powerpoint "Feminine hygiene product use and the risk of ovarian cancer"

Committee on the State of the Science in Ovarian Cancer Research; Board on Health Care Services; Institute of Medicine; National Academies of Sciences, Engineering, and Medicine. Ovarian Cancers: Evolving Paradigms in Research and Care

Cesario, Sandra. PTT-Feminine hygiene product use and the risk of ovarian cancer (*Unpublished*).

Crowley M. (November 12, 2018) Rule 26 report of Michael M. Crowley, PhD regarding the fragrance chemical constituents in Johnson & Johnson Talcum Powder Products

Daniel Cramer Report - Echeverria

Daniel Cramer Supplemental Report - Echeverria

David Steinberg, expert report

David Steinberg, FRAPS Exhibit 14: Statement of Michael M. Landa, J.D.

David Steinberg, CV

David Steinberg publications list

David Steinberg signed verification Di Saia, P. J. (2015). Letter to Kathleen A. Frazier. Unpublished letter.

Defense Expert Reports from Blaes Case: DeSesso; Hoel; Di Saia; Muscat; Hopkins

Deposition Exhibit of John Hopkins – 28 (November 5, 2018)

Deposition Exhibit of Julie Pier – 47 (September 13, 2018)

Deposition Transcript of Alice Blount, *Ingham v. Johnson & Johnson, et al.* (April 13, 2018)

Deposition Transcript & Exhibits - Julie Pier, MDL No. 2738 (September 12 – 13, 2018)

Deposition transcript, 10/19/2012 - John Hopkins

Deposition Transcript & Exhibits - John Hopkins, MDL No. 2738 (Aug. 16 – 17, 2018, Oct.
17, 2018, Nov. 5, 2018)

Deposition Transcript & Exhibits - Joshua Muscat, MDL No. 2738 (Sept. 25, 2018)

Deposition Transcript & Exhibits - Linda Loretz, MDL No. 2738 (July 17, 2018, Oct. 1 – 2,
2018)

Deposition Transcript & Exhibits - Robert Glenn, MDL No. 2738 (Oct. 18, 2018)

D. L. Longo, R. C. Young. Cosmetic talc and ovarian cancer (1979)

D. L. Longo, R. C. Young. Letter to the Editor: Cosmetic talc and ovarian cancer (1979)

Educational Report of Thomas Dydek

Excerpts from S. Sharma Deposition

Expert Report of Laura M. Plunkett, PhD, DABT – Oct. 5, 2016

Expert Report of Jack Siemiatycki, MSc, PhD – Oct. 4, 2016

Fair warning TalcDoc 5 - Exhibit 113 (JNJNL91_000022019)

Fair warning TalcDoc 15

FDA Authority Over Cosmetics April 6, 2015

FDA Response to Citizen's Petition re: Docket Numbers 94P-0420 and FDA-2008-P-0309-
00001/CP

Federal Register – 81 FR 91722 – Banned Devices – Powdered Gloves

Fox v. Johnson & Johnson, Trial Transcript

Godleski, J. J. (2015). Letter to R. Allen Smith, Jr. Unpublished letter.

John J. Godleski, M.D. - Expert Report from Blaes Case

John Godleski Report - Echeverria

John Godleski Supplemental Report - Echeverria

Hopkins, J. (2015). Letter to Gene M. Williams. Unpublished letter.

Johnson's Baby Powder - website, product description

Kemp Hearing Transcript - Douglas Weed

Longo, Rigler, Egeland. MAS Project 14-1852: Below the Waist Application of Johnson & Johnson Baby Powder, September 2017

Longo, Rigler - Analysis of Johnson & Johnson Baby Powder & Valiant Shower to Shower talc products for amphibole (tremolite) asbestos, August 2017

Longo, Rigler - Analysis Report MAS Project #14-1683 Johnson's Baby Powder Sample Set, April 2017

Longo, Rigler - TEM Analysis of historical 1978 Johnson's Baby Powder Sample for amphibole asbestos, February 2018

Longo, Rigler – Expert Report In re: Talcum Power Prod. Liab. Litig., MDL No. 2738 (November 14, 2018).

“Making it up as he goes along: Paolo Boffetta, Italian Epidemiologist, distorts power line health risks” - <https://microwavenews.com/news-center/boffetta-post-truth>.

Material Safety Data Sheet from Luzenac America, Inc.; Version 45.0, updated 6/18/08 (Group 1)

Material Safety Data Sheet from Luzenac America, Inc. (Group 3)

Material Safety Data Sheet from Luzenac America, Inc.; Version 2.0, updated 2/26/09 (Group CAN)

Material Safety Data Sheet from Luzenac America, Inc. (Group 1)

MBS Invoices – December 2007, April 2012, May 2013, July 2013, December 20013, January 2015, March 2015

MSDS Sheet, Version 2.0

Muscat, J. E. (2015). Report on the Relationship between Hygienic Use of Talc and the Risk of Ovarian Cancer. Unpublished report.

NPR Article Johnson & Johnson Pledges to Purge Controversial Chemicals April 16, 2015

Ness, R. B. (2015). Report on the question of whether genital talc use causes ovarian cancer. Unpublished report.

Ness, R. Expert Report - Jacqueline Fox

Ness, R. Commentary "A plaintiff's witness in the baby powder case"

NTP "The Report on Carcinogens Tenth Edition - Factsheet"

Omiecinski, C. J. (2015). Opinion on the Relationship Between Chronic Perineal/Genital Exposures to Cosmetic Talc and Ovarian Cancers: Mechanistic Aspects and Biological Plausibility Unpublished report.

Osann, K. (2016). Report on Perineal Talc Exposure and Risk of Ovarian Cancer. Unpublished report.

Personal Care Products Council Letter – July 21, 2009 to FDA re: Comments to FDA Citizen's Petition to the Commissioner of the Food and Drug Administration Seeking a Cancer Warning on Talc Products

Photographs of Johnson's Baby Powder

Photographs of Shower to Shower

Riham Sheble, Shabina Khatri. DOHA News - Johnson's baby powder of Qatar shelves after US cancer lawsuit verdict

Roe. Controversy: Cosmetic talc and ovarian cancer (1979)

Rosenthal, G. J. (2015). Opinion on Relationships Between the Toxicology of Cosmetic Talc and the Pathogenesis of Ovarian Cancer. Unpublished report.

Rosenthal, G - Expert Report from Blaes Case: "Opinion on Relationships Between the Toxicology of Cosmetic Talc and the Pathogenesis of Ovarian Cancer"

Rothman, Pastides, Samet. (2000) Interpretation of epidemiologic studies on talc and ovarian cancer

Slemp v. Johnson & Johnson, et al., Trial Transcript

Summary Minutes of the NTP Board of Scientific Counselors Report on Carcinogens (RoC) Subcommittee Meeting

Talc Removed from 12th RoC- The Rose Sheet October 24, 2005

WHMIS Classification for Talc, non fibrous - CNESST; CAS Number: 14807-96-6

Weed, Douglas. A Report Regarding General Causation and an Evaluation of the Reliability and Validity of the Plaintiffs' Experts' Reports Designated for the Plaintiff, Lori Oules (Feb. 1, 2017)

17. Curriculum Vitae – Jack Siemiatycki

CURRICULUM VITAE

Jack Siemiatycki

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STATISTICAL SUMMARY OF SELECTED ACCOMPLISHMENTS

Publications in peer-reviewed journals	245
Book chapters, IARC Monographs	20
Other publications, reports	42
Book (authored)	1
Invited presentations	173
Conference presentations, posters, abstracts : offered and accepted	181
Grants received as P.I. (number)	36
Grants received as P.I. (\$)	\$15.4M
Grants received as co-investigator (number)	59
Grants received as co-investigator (\$)	\$27.9M
H-factor (google scholar)	64
Instances of participation on expert panels, committees, boards of directors, at invitation of governments or public health agencies or research agencies or universities	126
Grant review panels or referee for external institution or journal editorial boards	65
Honours	several

GENERAL INFORMATION

Work address

Université de Montréal
Research Center of CHUM
850 rue St Denis, Montréal, QC, Canada H2W 1V1

Tel: (514) 890-8166
Fax: (514) 412-7106
E-mail: j.siemiatycki@uMontréal.ca

EDUCATION

1967 B.Sc. (mathematics); McGill University
1970 M.Sc. (mathematical statistics); McGill University
1976 Ph.D. (epidemiology and medical statistics); McGill University
1977 Post-doctoral (cancer epidemiology); International Agency for Research on Cancer, Lyon

CURRENT ACADEMIC APPOINTMENTS

Professor, Department of Social and Preventive Medicine, Université de Montréal (since 2001)
Cancer Research Society-Guzzo Research Chair in Environment and Cancer, Université de Montréal (since November 2007)
Adjunct Professor, Department of Epidemiology, Biostatistics and Occupational Health, McGill University. (since 1979)
Fellow, Canadian Academy of Health Sciences (since 2008)

PREVIOUS ACADEMIC APPOINTMENTS AND WORK EXPERIENCE

1967-71 Research Fellow; Department of Epidemiology and Health, McGill University.
1970-72 Research Director; Pointe St. Charles Community Clinic, Montréal.
1978 Consultant; International Agency for Research on Cancer, Lyon.
1978-2001 Assistant, then Associate (1979), then full Professor (1983):
Epidemiology Research Center, Institut Armand-Frappier, Laval, Québec.
1982-1986 Associate member, McGill Cancer Center, McGill University.
1996-1997 Visiting Scientist. International Agency for Research on Cancer, Lyon.
2001-2015 Canada Research Chair (Tier 1), Université de Montréal (resigned 2011).
2003-2009 Affiliate Scientist. McLaughlin Centre for Pop'n Health Risk Assessment, Univ of Ottawa.

SIGNIFICANT INTERNAL ADMINISTRATIVE APPOINTMENTS

1982-86 Director, Équipe associée de l'Institut de Recherche en Santé et Sécurité du Travail sur les cancers professionnels (affiliated research team of the Quebec Institute for Occupational Health and Safety on Occupational Cancer).
1988-91 Director, Epidemiology Research Center, Institut Armand-Frappier.
1990-98 Director, Équipe prioritaire de recherche en épidémiologie environnementale du FRSQ. (Priority research team in environmental epidemiology)
1998-2001 Member, Governing Council (Conseil d'administration). Institut national de la recherche scientifique, Université du Québec.
2000-2007 Coordinator. Program of Research in Environmental Epidemiology of Cancer (PREECAN), a national program funded by the National Cancer Institute of Canada.
2002-2005 Associate Director for Population Health Sciences, Research Center of the University of Montréal Hospital Center.

- 2006-2007 Director, Epidemiology program, PhD public health, Université de Montréal.
2006-2014 Director, Axe risques à la santé (Health Risks Division). Centre de recherche du Centre hospitalier de l'Université de Montréal.

SIGNIFICANT INSTITUTIONAL COMMITTEES

- 1979-80 Member of faculty committee to negotiate a collective agreement with the Institut Armand-Frappier administration.
1982-92 Member, Research Council. Institut Armand-Frappier.
1998-2001 Member, Institutional advisory council. Institut Armand-Frappier. Institut national de la recherche scientifique
2002-2006 Comité de direction. Centre de recherche du CHUM
2002-2017 Member, Various committees of the Dept Med Soc et Preventive, including Promotions, and Recruitment.
2006-2009 Member, Various committees established to set up a new School of Public Health at l'Université de Montréal
2006-2014 Comité Scientifique de la Recherche du CHUM.

CURRENT MAJOR EXTERNAL BOARDS, SCIENTIFIC COMMITTEES (INVITED)

1. Chair of Scientific Advisory Committee of CONSTANCES, a large prospective cohort established in France, under aegis of INSERM, Ministère de la Santé, and other agencies. Since 2011.
2. Member of Comité national d'épidémiologie en cancérologie. Ministère de la Santé et des Services sociaux, Quebec. Since 2014.
3. Member, Advisory committee to Directors of Cartagene, a Quebec population cohort.

PAST MAJOR EXTERNAL BOARDS, SCIENTIFIC COMMITTEES, CONSULTATIONS (INVITED)

1. Expert consultative committee to Commission de la santé et sécurité du travail du Québec on the epidemiologic function of the CSST. 1979-80.
2. President of Organizing Committee of Annual Congress of Quebec Public Health Association, Montréal. 1982.
3. Consultative committee of International Agency for Research on Cancer on feasibility of SEARCH programme. 1982.
4. Canadian representative. International Joint Commission (U.S. and Canada) Committee on the Assessment of Human Health Effects of Great Lakes Water Quality. 1982-89.
5. Task Force on Chemicals in the Environment and Human Reproduction Effects in New Brunswick. 1983-85.
6. Chairman and organizer of international workshop sponsored by International Agency for Research on Cancer, Lyon, on use of job exposure information in cancer case-control studies. 1984.
7. Quebec Government Consultative Committee on Alachlor. 1985-86.
8. Chairman and organizer of the International Joint Commission Workshop on the Role of Epidemiology in Assessing the Effects of Great Lakes Water Quality on Human Health, Scarborough, March 1988. 1986-88.
9. Priority Substances Advisory Panel. Panel established under terms of Canadian Environmental Protection Act by Health and Welfare Canada. 1988.
10. Working Group on Electromagnetic Fields under auspices of Health Effects Institute. 1991.
11. Consultative Committee on Environment-related Cancer Surveillance, LCDC, Health and Welfare Canada. 1993-1996.
12. Consultative Committee on an Investigation of Lung Cancer and Environmental Tobacco Smoke, Environmental Health Directorate, Health Canada. 1994-1995.
13. Working Group on Evaluation of Carcinogenicity of Carbon Black, Printing Trades and Various Substances. Monograph Programme. International Agency for Res. on Cancer, Lyon, 1995.

14. Working Group on Human Cancer Risks associated with Chrysotile Asbestos. World Health Organization (IPCS) Geneva, June 1995.
15. Secretariat on Evaluation of Chemopreventive Effect of Aspirin and Other NSAIDS for Cancer. International Agency for Res. on Cancer, Lyon, Apr. 1997.
16. Chair. Symposium on Health Risks of Water Disinfection By-products. Convened by Health Canada. Ottawa. May 1997.
17. Working Group. Meeting on Species-specificity in response to carcinogens. Monograph Programme. International Agency for Res. on Cancer, Lyon, Nov. 1997.
18. Board of Directors. Canadian Society for Epidemiology and Biostatistics. 1997-1999.
19. Working Group. Evaluation of Carcinogenicity of Various Industrial Substances. Monograph Programme. International Agency for Res. on Cancer, Lyon, Feb. 1998.
20. Canadian Coalition on Cancer Surveillance. 1997-2002.
21. External site review panel. U.S. National Cancer Institute Epidemiology Branch. June 1999.
22. Organizing Committee for Medical Research Council Workshop on Privacy of Health Data. 1999-2000.
23. Organizing Committee, EPI2001. Joint North American Congress of Canadian Society for Epidemiology and Biostatistics, Society for Epidemiologic Research, American Public Health Association (Epid) and American College of Epidemiology, Toronto, 14 – 16 June 2001. 1999-2001.
24. Coordinator of national initiative of the public health community to provide guidance on the structures and functioning of the new Canadian Institutes of Health Research. 1999-2000.
25. Organizing Committee. World Congress of the International Epidemiological Association, Montréal, 18-22 August 2002. 2001-2002.
26. President. Canadian Society for Epidemiology and Biostatistics. 2001-2003. Member of Board. 1997-1999.
27. Working Group. Evaluation of Carcinogenicity of Various Substances. Monograph Programme. International Agency for Res. on Cancer, Lyon, 2003.
28. Jury of Consensus Conference on risks and benefits of vaccination for hepatitis B. For Minister of Health of France. Organized by INSERM and ANAES. Paris 2003.
29. Public Advisory Panel. Vinyl Council of Canada. 1998-2004.
30. Advisory Panel. U.S. National Cancer Institute Brain Tumor Study. 1998-2003.
31. Scientific Advisory Committee. Boeing/UAW Workers' Health Studies. 1999-2005.
32. Institute Advisory Board. Canadian Institutes for Health Research – Institute of Circulatory and Respiratory Health. 2001-2005.
33. National Occupational Research Agenda (NORA). Joint consultative committee for US National Cancer Institute and US National Institute for Occupational Safety and Health. 2002-2005.
34. Canadian Cancer Surveillance Alliance. Consultative committee of Health Canada, Canadian Cancer Society, Provincial Cancer Registries, Statistics Canada. 2002-2003.
35. Co-president. Organizing Committee of Joint SER-CSEB Congress, Toronto 27-30 June 2005. (2004-2005).
36. Chair. Monograph Program Meeting. International Agency for Research on Cancer (WHO), France. February 2006.
37. Advisory Committee on Research Ethics and Databanks. Quebec Health Research Council (FRSQ). 2003-2011.
38. Board of Directors. American College of Epidemiology. 2003-2006.
39. Board of Directors. National Cancer Institute of Canada. 2003-2007.
40. Member Scientific Council International Agency for Research on Cancer (WHO). Lyon, France 2005-2009.
41. Elected Chair. Scientific Council International Agency for Research on Cancer (WHO). Lyon, France 2008-2009.
42. Scientific Advisory Council Canadian Partnership Against Cancer 2007-2009.
43. Advisory Committee. Occupational Cancer Research Centre of Ontario. Since 2009.
44. Working Group on Cancer Prevention, CPAC, 2007-2010.

45. Subgroup Chair and Working Group Member. Evaluation of Carcinogenicity of Non-Ionizing Radiation, Radiofrequency Electromagnetic Fields. Monograph Programme. International Agency for Research on Cancer, Lyon May 2011.
46. Member of Scientific Advisory Board of Bordeaux cancer research center SIRIC-BRIO, Bordeaux France. Since 2013.
47. Member of external review panel. Helmholtz Center Munich Research Institute. Germany. July 2011.
48. Conseil Scientifique de l'Institut de Recherche en Santé Publique (IReSP). Under aegis of INSERM and Ministère de la Santé, France. 2004-2009.
49. Adviser and expert witness for legal team conducting a major class action lawsuit against the Canadian tobacco industry. 2007-2014.

OTHER SIGNIFICANT EXTERNAL CONSULTATIONS (INVITED)

1. Consultation with Quebec Ministry of Justice regarding compensation for homeowners who were advised to use formaldehyde-base home insulation - 1983.
2. Invited participant. Workshop convened by the Science Council of Canada on the future of Epidemiology in Canada, Ottawa - 1985.
3. Consultation with Government of Alberta regarding the evaluation of a report alleging significant health impact in the environment of a sour-gas plant - 1985.
4. Consultation with Quebec Ministry of Environment regarding health effects of residency near an abandoned toxic waste site in LaSalle, Quebec - 1987.
5. Invited participant. Workshop convened by Canadian Public Health Association, Environment Canada and Health and Welfare Canada on Environmental Impact Assessment, Ottawa - 1987.
6. Invited participant. Annual workshops convened by Health Protection Branch of Health and Welfare Canada to discuss the role of Canada in the SEARCH programme of the International Agency for Research on Cancer, Ottawa - 1987-1989.
7. Consultation with Quebec Cree Band Council regarding a research proposal to study developmental effects of consuming fish with high mercury levels - 1989.
8. Invited participant. Workshop convened by Ontario Industrial Disease Standards Panel on the use of epidemiologic data in workers' compensation, Toronto - December 1989.
9. Invited participant. Workshop convened by National Academy of Sciences (U.S.) on Carcinogenicity of Complex Mixtures, Tucson, Arizona - Jan 1990.
10. Invited participant. Workshop convened by Laboratory Centers for Disease Control, Health and Welfare Canada on Multiple Chemical Sensitivities, Ottawa - May 1990
11. Member of expert advisory panel to the pan-Canadian case-control study of electromagnetic fields and childhood leukemia. Sponsored by Canadian Electrical Assoc, EPRI (U.S.A.), Health and Welfare Canada. 1990-1996.
12. Organizer of Workshop to Plan a Pan-North American Case-control Study of Lung Cancer. Sponsored by Health and Welfare Canada. Toronto. March 1991.
13. Invited participant. Workshop convened by Environmental Health Directorate of Health and Welfare Canada, on Environmental Epidemiology in Canada. Ottawa. March 1992
14. Invited participant. Workshop convened by Harvard Center for Risk Analysis on implementing a new type of risk assessment. Maryland. April 1992.
15. Member of Technical Advisory Panel for epidemiology studies of foundry workers - CIIT. Research Triangle Park, N.C. Feb. 1993
16. Consultant to Health Effects Institute - Asbestos Research, on Options for Characterizing Worker Activities in Buildings, Boston. Feb. 1993.
17. Advisory panel to Laboratory Centers for Disease Control, Health and Welfare Canada, on Environmental Epidemiology under the Green Plan. March 1993.
18. Member of External Advisory Committee. Champlain Adirondack Biosphere Environmental Health Sciences Center, University of Vermont. 1993.
19. Consultant to Michigan Cancer Foundation on a variety of epidemiologic studies. 1993-1996.

20. Invited to address President Clinton's Panel on Cancer regarding priorities in cancer research. Bethesda, MD. April 1994.
21. Invited participant. Science and Technology Review Consultation. Government of Canada. Montréal. September 1994.
22. Invited participant. Strategic planning workshop to reduce Environmental Tobacco Smoking exposure. Laboratory Centre for Disease Control. Health Canada. Oct 1995.
23. Invited participant. Meeting to establish new priorities for funding. National Health Research and Development Programme of Canada. Montréal. Feb 1996.
24. Chair Scientific Advisory Committee for the Dalhousie University study of health effects of environmental and occupational pollution in the area of the Sydney, Nova Scotia steel industry. 1996.
25. Member of two Ministerial missions of the Quebec and Canadian governments to France to discuss with French experts the risks associated with low level exposure to chrysotile asbestos. Paris. Oct 1996.
26. Chair. Meeting of collaborators of European network of studies on lung cancer and smoking.
27. International Agency for Res. on Cancer, Lyon. June 1997.
28. Member of Canadian scientific delegation to United Kingdom to discuss with British experts the risk associated with low level exposure to chrysotile asbestos. London, Sept. 1997.
29. Symposium chair. Workshop to discuss methods of predicting numbers of cases of mesothelioma to be expected in various countries. Paris. Dec. 1997.
30. Invited participant and subgroup reporter. Peer Review on Hazard Assessment and Dose-Response Characterization for the Carcinogenicity of Formaldehyde by the Route of Inhalation. Health Canada and U.S. EPA. Ottawa. March 1998.
31. Co-chair. Workshop to explore the feasibility of an international collaborative study on use of cellular phones and risk of cancer. International Agency for Research on Cancer. Lyon. Feb 1999.
32. Panellist. Consensus Meeting for a Proposed Integrated National Health Surveillance Network. Health Canada. 1999.
33. Invited participant. Medical Research Council Summit Meeting on the new Canadian Institutes of Health Research. Toronto. June, 1999.
34. Invited participant. Planning group for an Institute of Population Health Research in CIHR. Jul-Dec 1999.
35. Invited speaker. Workshop for a Canadian Institute for Genetics Research. May 2000.
36. Invited participant. Workshop to explore the use of prospective cohorts to investigate gene-environment interactions in cancer etiology. National Cancer Institute. Rockville, MD. May 2000.
37. Invited participant. Founding meeting of Canadian Association for Workplace Safety and Health. Montréal. Jan 2001.
38. Invited participant. Workshop to advise Canadian Foundation for Innovation on its role in supporting population health research in Canada. Toronto, Feb 2001.
39. Invited participant. Consultative committee to advise Cancer Care Ontario on priorities in environmental cancer. April 2001.
40. Invited participant. Workshop on national priorities in cancer research. Institute for Cancer Research. CIHR. Toronto. May 2001.
41. Invited participant. Delphi process to advise Canadian Institutes of Health Research on priorities in cancer research. October-December 2001.
42. Invited participant. Delphi process to advise Cancer Care Ontario on priorities in cancer prevention. November-April 2002.
43. Session Chair. NIOSH workshop "Applying New Biotechnologies to the Study of Occupational Cancer", Washington, D.C. May 2002.
44. Member of Advisory Panel. U.S. National Cancer Inst. Study of a Cohort of Chinese Workers Exposed to Benzene. 2002- .
45. Invited participant. Delphi process to advise Cancer Care Ontario on priorities in cancer prevention. November-April 2002.
46. Session Chair. NIOSH workshop "Applying New Biotechnologies to the Study of Occupational Cancer", Washington, D.C. May 2002.

47. Organizer and Session Chair. International Epidemiological Association Meeting. Occupation and Health. Montréal. August, 2002.
48. Co-Organizer and Session Chair. Epidemiological Association Meeting. Asbestos and mesothelioma. Montréal. August, 2002.
49. Session Chair. Epidemiological Association Meeting. Environment and Health. Montréal Aug, 2002.
50. Invited participant. CIHR National Forum to devise a National Research Programme for Environmental Health. Ottawa. Sept 2002.
51. Invited participant. CIHR national forum on privacy of health data. Ottawa, November, 2002.
52. Member. Environmental and Occupational Carcinogens Advisory Group. Canadian Cancer Society. 2002 - 2004.
53. Participant. Meeting to discuss the establishment of a prospective childhood cohort in Canada. CIHR-IPPH. March 2004.
54. Member of working group on national cohort project. National Cancer Research Initiative. January-June 2004.
55. Member of advisory group on development of IDEES, Université de Montréal. January-June 2004.
56. Member, ad-hoc group to explore the feasibility of a Canadian cohort on cancer and chronic disease. 2004-2008.
57. Invited participant. Workshop to discuss the enhancement of population health research in Canada. CIHR-IPPH. June 2004.
58. Invited participant. Workshop on occupational cancer surveillance. Occupational Cancer Research & Surveillance Project (Cancer Care Ontario and the Ontario Workplace Safety & Insurance Board). February 2005.
59. Invited participant. Workshop on long-term large-scale cohorts. CIHR, December 2005.
60. Member. Advisory Scientific Committee. IBM – University of Alabama project on health of IBM manufacturing plant workers. 2006 - 2008.
61. Advisor and meeting participant. Ontario Workplace Safety and Insurance Board. Recommendations on how to develop occupational cancer research in Ontario. Toronto, 2005.
62. Invited participant. Workshop to estimate the burden of occupational cancer in the United Kingdom. UK Health and Safety Executive. Manchester. June 2006.
63. Advisory Committee to British Energy Networks Association. Workshop on the Future Needs of Electromagnetic Fields Occupational Studies in the Electric Utility Industry. Edinburgh. September 2006.
64. Advisory Committee. IARC Monograph Programme Planning of Special Volume 100. Lyon. September 2006.
65. Grant Review Panel. IVRSP. Paris. September 2006.
66. Advisory Committee to CCRA and ICR (CIHR) on the nature of a national cohort platform. Toronto, September 2006.
67. Invited participant. Comité d'éthique de la recherche de la faculté de médecine (CERFM) : Discussion d'un projet soumis pour la création d'une banque de données et de matériaux biologiques (Research Ethics Committee of the Faculty of Medicine: Review of a submitted project to create a bank of data and biologic samples). Université de Montréal. March 2007.
68. Invited participant. Workshop to Design and Implement the Ontario Cohort Consortium Research Platform. Toronto. June 2007.
69. Invited participant. Canadian Cancer Research Agencies. Strategic Planning Consultation in Montréal. May 2009.
70. Invited participant. IARC-NORA workshop to identify gaps of knowledge on occupational carcinogens, Lyon. June 2009.
71. Consultant. State of the science workshop: evaluation of epidemiological data consistency for application in regulatory risk assessment. US EPA and Johns Hopkins School of Public Health. Baltimore. September 2010.
72. Consultant. World Health Organisation. Re-evaluation of Risk Assessments related to DDT exposure. Geneva. November 2010.

73. Invited participant. WHO workshop to develop international guidelines for control of environmental carcinogens. Asturias. March 2011.
74. Session Chair. Discovering occupational carcinogens. Congress of Epidemiology. Montréal June 2011.
75. Invited co-organiser. Symposium of Environment and Cancer. Canadian Cancer Research Conference. Toronto. November 2011.
76. Invited organiser and Chair. Symposium on Cellphones and Cancer. American Association for Cancer Research. Chicago, April 2012.
77. Member Scientific Program Committee for the 2013 Canadian Cancer Research Conference, Toronto. November 2013.
78. Member of Advisory Committee to National Cancer Institute (U.S.) study on carcinogenicity of diesel emissions. 2017.

HONOURS

1. Biographee in various Who's Who in America versions. Since 1982
2. Perron-Desrosiers Prize. Granted by the Governing Council of the Institut Armand-Frappier. 1985.
3. Invited to give the annual Elizabeth Stern Memorial Lecture in U.C.L.A. School of Public Health. 1985.
4. National Health Scholar. National Health Research and Development Programme of Canada. 1988-1998.
5. Visiting Scientist Award. International Agency for Research on Cancer, Lyon. 1996-97.
6. Prix d'excellence. Institut national de la recherche scientifique. Université du Québec. 1999.
7. Distinguished Scientist Award. Medical Research Council, Canada. 1999-2004.
8. Canada Research Chair in Environmental Epidemiology and Population Health. 2001-2015.
9. Distinguished Scientist Lecturer. US National Cancer Institute. Division of Cancer Epidemiology and Genetics. 2006.
10. Cancer Research Society-Guzzo Chair in Environment and Cancer. Since 2007.
11. Fellow Canadian Academy of Health Sciences. Since 2008.
12. Geoffrey R Howe Distinguished Contributions Award, Canadian Society for Epidemiology & Biostatistics. 2011.
13. Ranked top Canadian public health researcher in terms of research productivity by Jarvey et al. 2012.

GRANT REVIEW, JOURNAL REVIEW AND PERSONNEL REVIEW

Associate Editor

American Journal of Epidemiology (1989-1998)

International Journal of Environmental Health (1991-)

Contributing Editor

Journal of Public Health Policy (1982-87)

American Journal of Industrial Medicine (1996-)

The Open Epidemiology Journal (2007-)

Chairman of grant review panels

National Health Research and Development Programme. Canada. (1990-94)

National Cancer Institute of Canada (1994-1995)

Member of grant review panels

40 times

External referee for tenure or promotion of personnel in other institutions

15 times

THESES

1. Siemiatycki J. "Space-time clustering: finding the distribution of a correlation-type statistic". M.Sc. thesis, McGill University, 1971.
2. Siemiatycki J. "Evaluation of strategies for household health surveys". Ph.D. thesis, McGill University, 1976.

ARTICLES PUBLISHED PEER REVIEW

1. Thurlbeck WM, Horowitz I, Siemiatycki J, Dunnill MS, Maisel JC, Pratt P, et al. Intra- and inter-observer variations in the assessment of emphysema. *Archives of Environmental Health*. 1969;18:646-59.
2. Becklake MR, Fournier-Massey G, McDonald JC, Siemiatycki J, Rossiter CE. Lung function in relation to chest radiographic changes in Quebec asbestos workers. *Bulletin de Physio-Pathologie Respiratoire*. 1970;6:637-59.
3. McDonald JC, McDonald AD, Gibbs GW, Siemiatycki J, Rossiter CE. Mortality in the chrysotile asbestos mines and mills of Quebec. *Archives of Environmental Health*. 1971;22:677-86.
4. Siemiatycki J, McDonald AD. Neural tube defects in Quebec: a search for evidence of 'clustering' in time and place. *British Journal of Preventive and Social Medicine*. 1972;26:10-4.
5. Siemiatycki J. Mantel's space-time clustering statistic: computing higher moments and a comparison of various data transforms. *Journal of Statistical Computation & Simulation*. 1978;7:13-31.
6. Siemiatycki J. A comparison of mail, telephone, and home interview strategies for household health surveys. *American Journal of Public Health*. 1979;69(3):238-45.
7. Siemiatycki J, Brubaker G, Geser A. Space-time clustering of Burkitt's lymphoma in east Africa: analysis of recent data and a new look at old data. *International Journal of Cancer*. 1980;25:197-203.
8. Siemiatycki J, Richardson L. Statut socio-économique et utilisation des services de santé à Montréal. *L'Actualité Economique*. 1980(Avril-Juin):194-210.
9. Siemiatycki J, Richardson L, Pless IB. Equality in medical care under national health insurance in Montréal. *New England Journal of Medicine*. 1980;303:10-5.
10. Colle E, Siemiatycki J, West R, Belmonte MM, Crepeau MP, Poirier R, et al. Incidence of juvenile onset diabetes in Montréal - demonstration of ethnic differences and socio-economic class differences. *Journal of Chronic Diseases*. 1981;34(12):611-6.
11. Siemiatycki J, Day NE, Fabry J, Cooper JA. Discovering carcinogens in the occupational environment: a novel epidemiologic approach. *Journal of the National Cancer Institute*. 1981;66(2):217-25.
12. Siemiatycki J, Thomas DC. Biological models and statistical interactions: an example from multistage carcinogenesis. *International Journal of Epidemiology*. 1981;10(4):383-7.
13. Siemiatycki JA, Richardson LJ. Le défi prioritaire en santé communautaire : Élargir notre vision pour atteindre nos véritables objectifs. *L'Union Médicale du Canada*. 1981;110:1008-12.
14. Pampalon R, Siemiatycki J, Blanchet M. Pollution environnementale par l'amiante et santé publique au Québec [Environmental asbestos pollution and public health in Quebec]. *L'Union Médicale du Canada*. 1982;111(5):475-82, 87-89.
15. Siemiatycki J, Gérin M, Richardson L, Hubert J, Kemper H. Preliminary report of an exposure-based, case-control monitoring system for discovering occupational carcinogens. *Teratogenesis, Carcinogenesis, and Mutagenesis*. 1982;2:169-77.
16. *Baumgarten M, Siemiatycki J, Gibbs GW. Validity of work histories obtained by interview for epidemiologic purposes. *American Journal of Epidemiology*. 1983;118(4):583-91.
17. Hours M, Fabry J, Siemiatycki J, Francois R. Diabète insulino-dépendant juvénile. Étude descriptive dans le département du Rhône. *Revue d'épidémiologie et de santé publique*. 1984;32:107-12.
18. Siemiatycki J, Campbell S. Nonresponse bias and early versus all responders in mail and telephone surveys. *American Journal of Epidemiology*. 1984;120(2):291-301.

19. Siemiatycki J, Campbell S, Richardson L, Aubert D. Quality of response in different population groups in mail and telephone surveys. *American Journal of Epidemiology*. 1984;120(2):302-14.
20. *Dewar RAD, Siemiatycki J. A program for point and interval calculation of odds ratios and attributable risks from unmatched case-control data. *International Journal of Bio-Medical Computing*. 1985;16:183-90.
21. Gérin M, Siemiatycki J, Kemper H, Bégin D. Obtaining occupational exposure histories in epidemiologic case-control studies. *Journal of Occupational Medicine*. 1985;27(6):420-6.
22. Siemiatycki J. Long-term funding for epidemiologic research. *Journal of Chronic Diseases*. 1985;38(3):211-2.
23. Thomas DC, Siemiatycki J, Dewar R, Robins J, Goldberg M, Armstrong BG. The problem of multiple inference in studies designed to generate hypotheses. *American Journal of Epidemiology*. 1985;122(6):1080-95.
24. Gérin M, Siemiatycki J, Bégin D, Kemper H, Lakhani R, Nadon L, et al. Dépistage épidémiologique des facteurs cancérigènes de l'environnement de travail montréalais: un premier bilan. *Travail et Santé*. 1986;2(3):S42-S6.
25. *Goldberg MS, Siemiatycki J, Gérin M. Inter-rater agreement in assessing occupational exposure in a case-control study. *British Journal of Industrial Medicine*. 1986;43:667-76.
26. Siemiatycki J, Colle E, Aubert D, Campbell S, Belmonte MM. The distribution of type I (insulin-dependent) diabetes mellitus by age, sex, secular trend, seasonality, time clusters, and space-time clusters: evidence from Montréal, 1971-1983. *American Journal of Epidemiology*. 1986;124(4):545-60.
27. Siemiatycki J, Richardson L, Gérin M, Goldberg M, Dewar R, Désy M, et al. Associations between several sites of cancer and nine organic dusts: results from an hypothesis-generating case-control study in Montréal, 1979-1983. *American Journal of Epidemiology*. 1986;123(2):235-49.
28. Thomas DC, Goldberg M, Dewar R, Siemiatycki J. Statistical methods for relating several exposure factors to several diseases in case-heterogeneity studies. *Statistics in Medicine*. 1986;5:49-60.
29. *Guay D, Siemiatycki J. Historic cohort study in Montréal's fur industry. *American Journal of Industrial Medicine*. 1987;12:181-93.
30. Siemiatycki J, Dewar R, Nadon L, Gérin M, Richardson L, Wacholder S. Associations between several sites of cancer and twelve petroleum-derived liquids. Results from a case-referent study in Montréal. *Scandinavian Journal of Work, Environment and Health*. 1987;13:493-504.
31. Siemiatycki J, Wacholder S, Richardson L, Dewar R, Gérin M. Discovering carcinogens in the occupational environment: methods of data collection and analysis of a large case-referent monitoring system. *Scandinavian Journal of Work, Environment and Health*. 1987;13:486-92.
32. Diabetes Epidemiology Research International Group. Geographic patterns of childhood insulin-dependent diabetes mellitus. *Diabetes*. 1988;37:1113-9.
33. Siemiatycki J. Epidemiologic approaches to evaluation of carcinogens. In: *Living in a Chemical World*. Annals of the New York Academy of Sciences. 1988;534:395-9.
34. Siemiatycki J, Colle E, Campbell S, Dewar R, Aubert D, Belmonte MM. Incidence of IDDM in Montréal by ethnic group and by social class and comparisons with ethnic groups living elsewhere. *Diabetes*. 1988;37(8):1096-102.
35. Siemiatycki J, Gérin M, Stewart P, Nadon L, Dewar R, Richardson L. Associations between several sites of cancer and ten types of exhaust and combustion products. Results from a case-referent study in Montréal. *Scandinavian Journal of Work, Environment and Health*. 1988;14:79-90.
36. Siemiatycki J, Wacholder S, Dewar R, Cardis E, Greenwood C, Richardson L. Degree of confounding bias related to smoking, ethnic group, and socioeconomic status in estimates of the associations between occupation and cancer. *Journal of Occupational Medicine*. 1988;30(8):617-25.
37. Siemiatycki J, Wacholder S, Dewar R, Wald L, Bégin D, Richardson L, et al. Smoking and degree of occupational exposure: are internal analyses in cohort studies likely to be confounded by smoking status? *American Journal of Industrial Medicine*. 1988;13:59-69.

38. Gérin M, Siemiatycki J, Nadon L, Dewar R, Krewski D. Cancer risks due to occupational exposure to formaldehyde: results of a multi-site case-control study in Montréal. *International Journal of Cancer*. 1989;44:53-8.
39. Siemiatycki J. Friendly control bias. *Journal of Clinical Epidemiology*. 1989;42(7):687-8.
40. Siemiatycki J, Colle E, Campbell S, Dewar RAD, Belmonte MM. Case-control study of IDDM. *Diabetes Care*. 1989;12(3):209-16.
41. Siemiatycki J, Dewar R, Lakhani R, Nadon L, Richardson L, Gerin M. Cancer risks associated with 10 inorganic dusts: results from a case-control study in Montréal. *American Journal of Industrial Medicine*. 1989;16(5):547-67.
42. Siemiatycki J, Dewar R, Richardson L. Costs and statistical power associated with five methods of collecting occupation exposure information for population-based case-control studies. *American Journal of Epidemiology*. 1989;130(6):1236-46.
43. Diabetes Epidemiology Research International Group. Secular trends in incidence of childhood IDDM in 10 countries. *Diabetes*. 1990;39:858-64.
44. Hours M, Siemiatycki J, Fabry J, Francois R. [Time clustering and temporospatial regrouping study of cases of juvenile diabetes in the district of Rhône (1960-1980)]. *Revue d'épidémiologie et de santé publique*. 1990;38(4):287-95.
45. Terracini B, Siemiatycki J, Richardson L. Cancer incidence and risk factors among Montréal residents of Italian origin. *International Journal of Epidemiology*. 1990;19(3):491-7.
46. *Dewar R, Siemiatycki J, Gérin M. Loss of statistical power associated with the use of a job-exposure matrix in occupational case-control studies. *Applied Occupational & Environmental Hygiene*. 1991;6:508-15.
47. Gérin M, Siemiatycki J. The occupational questionnaire in retrospective epidemiologic studies: recent approaches in community-based studies. *Applied Occupational & Environmental Hygiene*. 1991;6(6):495-501.
48. Payment P, Franco E, Richardson L, Siemiatycki J. Gastrointestinal health effects associated with the consumption of drinking water produced by point-of-use domestic reverse-osmosis filtration units. *Applied and Environmental Microbiology*. 1991;57(4):945-8.
49. Payment P, Richardson L, Siemiatycki J, Dewar R, Edwardes M, Franco E. A randomized trial to evaluate the risk of gastrointestinal disease due to consumption of drinking water meeting current microbiological standards. *American Journal of Public Health*. 1991;81(6):703-8.
50. Bégin D, Gérin M, de Guire L, Siemiatycki J, Adib G. Étude sur la validité des matrices emploi-exposition multisectorielles en hygiène industrielle. *Revue de médecine du travail*. 1992;XIX:74-9.
51. Soskolne CL, Jhangri GS, Siemiatycki J, Lakhani R, Dewar R, Burch JD, et al. Occupational exposure to sulfuric acid in southern Ontario, Canada, in association with laryngeal cancer. *Scandinavian Journal of Work, Environment and Health*. 1992;18(4):225-32.
52. Ursin G, Aragaki CC, Paganini-Hill A, Siemiatycki J, Thompson WD, Haile RW. Oral contraceptives and premenopausal bilateral breast cancer: a case-control study. *Epidemiology*. 1992;3(5):414-9.
53. Payment P, Franco E, Siemiatycki J. Absence of relationship between health effects due to tap water consumption and drinking water quality parameters. *Water Science & Technology*. 1993;27(3/4):137-43.
54. Siemiatycki J. Problems and priorities in epidemiologic research on human health effects related to wiring code and electric and magnetic fields. *Environmental Health Perspectives*. 1993;101(Suppl. 4):135-41.
55. Case BW, Dufresne A, Fraser R, Siemiatycki J, Perrault G, Takahashi K. Decoding occupational history from total lung particulate analysis: Concordance between physico-chemical analysis and occupational histories. *Annals of Occupational Hygiene*. 1994;38(Supplement 1):469-82.
56. Korner-Bitensky N, Wood-Dauphinee S, Siemiatycki J, Shapiro S, Becker R. Health-related information postdischarge: telephone versus face-to-face interviewing. *Archives of Physical Medicine and Rehabilitation*. 1994;75(12):1287-96.

57. Siemiatycki J, Dewar R, Krewski D, Desy M, Richardson L, Franco E. Are the apparent effects of cigarette smoking on lung and bladder cancers due to uncontrolled confounding by occupational exposures? *Epidemiology*. 1994;5(1):57-65.
58. Siemiatycki J, Dewar R, Nadon L, Gérin M. Occupational risk factors for bladder cancer: results from a case-control study in Montréal, Quebec, Canada. *American Journal of Epidemiology*. 1994;140(12):1061-80.
59. Takahashi K, Case BW, Dufresne A, Fraser R, Higashi T, Siemiatycki J. Relation between lung asbestos fibre burden and exposure indices based on job history. *Occupational & Environmental Medicine*. 1994;51(7):461-9.
60. Case BW, Dufresne A, Richardson L, Siemiatycki J, Takahashi K. Lung-retained dose following occupational exposure to silica. *Applied Occupational & Environmental Hygiene*. 1995;10(12):1031-6.
61. Nadon L, Siemiatycki J, Dewar R, Krewski D, Gerin M. Cancer risk due to occupational exposure to polycyclic aromatic hydrocarbons. *American Journal of Industrial Medicine*. 1995;28(3):303-24.
62. Siemiatycki J. Future etiologic research in occupational cancer. *Environmental Health Perspectives*. 1995;103 (Suppl 8):209-15.
63. Siemiatycki J, Krewski D, Franco E, Kaiserman M. Associations between cigarette smoking and each of 21 types of cancer: a multi-site case-control study. *International Journal of Epidemiology*. 1995;24(3):504-14.
64. Upfal M, Divine G, Siemiatycki J. Design issues in studies of radon and lung cancer: implications of the joint effect of smoking and radon. *Environmental Health Perspectives*. 1995;103(1):58-63.
65. Ursin G, Paganini-Hill A, Siemiatycki J, Thompson WD, Haile RW. Early adult body weight, body mass index, and premenopausal bilateral breast cancer: data from a case-control study. *Breast Cancer Research and Treatment*. 1995;33(1):75-82.
66. Aronson KJ, Siemiatycki J, Dewar R, Gerin M. Occupational risk factors for prostate cancer: results from a case-control study in Montréal, Quebec, Canada. *American Journal of Epidemiology*. 1996;143(4):363-73.
67. *Fritschi L, Siemiatycki J. Melanoma and occupation: results of a case-control study. *Occupational & Environmental Medicine*. 1996;53(3):168-73.
68. *Fritschi L, Siemiatycki J. Lymphoma, myeloma and occupation: results of a case-control study. *International Journal of Cancer*. 1996;67(4):498-503.
69. *Fritschi L, Siemiatycki J, Richardson L. Self-assessed versus expert-assessed occupational exposures. *American Journal of Epidemiology*. 1996;144(5):521-7.
70. Haile RW, Witte JS, Ursin G, Siemiatycki J, Bertolli J, Thompson WD, et al. A case-control study of reproductive variables, alcohol, and smoking in premenopausal bilateral breast cancer. *Breast Cancer Research and Treatment*. 1996;37(1):49-56.
71. *Parent ME, Siemiatycki J, Renaud G. Case-control study of exposure to carbon black in the occupational setting and risk of lung cancer. *American Journal of Industrial Medicine*. 1996;30(3):285-92.
72. Siemiatycki J. Exposure assessment in community-based studies of occupational cancer. *Occupational Hygiene*. 1996;3:41-58.
73. *Parent ME, Siemiatycki J, Menzies R, *Fritschi L, Colle E. Bacille Calmette-Guerin vaccination and incidence of IDDM in Montréal, Canada. *Diabetes Care*. 1997;20(5):767-72.
74. Payment P, Siemiatycki J, Richardson L, Renaud G, Franco E, Prévost M. A prospective epidemiological study of gastrointestinal health effects due to the consumption of drinking water. *International Journal of Environmental Health Research*. 1997;7:5-31.
75. Siemiatycki J, *Fritschi L, Nadon L, Gerin M. Reliability of an expert rating procedure for retrospective assessment of occupational exposures in community-based case-control studies. *American Journal of Industrial Medicine*. 1997;31(3):280-6.
76. Witte JS, Ursin G, Siemiatycki J, Thompson WD, Paganinihill A, Haile RW. Diet and premenopausal bilateral breast cancer - a case-control study. *Breast Cancer Research and Treatment*. 1997;42(3):243-51.

77. Boffetta P, Burdorf A, Goldberg M, Merler E, Siemiatycki J. Towards the coordination of European research on the carcinogenic effects of asbestos. *Scandinavian Journal of Work, Environment and Health*. 1998;24(4):312-7.
78. *Camus M, Siemiatycki J, Meek B. Nonoccupational exposure to chrysotile asbestos and the risk of lung cancer. *New England Journal of Medicine*. 1998;338(22):1565-71.
79. Gerin M, Siemiatycki J, Desy M, Krewski D. Associations between several sites of cancer and occupational exposure to benzene, toluene, xylene, and styrene - results of a case-control study in Montréal. *American Journal of Industrial Medicine*. 1998;34(2):144-56.
80. Hu SW, Hertz-Picciotto I, Siemiatycki J. When to be skeptical of negative studies: pitfalls in evaluating occupational risks using population-based case-control studies. *Canadian Journal of Public Health Revue Canadienne de Sante Publique*. 1998;90(2):138-42.
81. *Parent ME, Siemiatycki J, Fritschi L. Occupational exposures and gastric cancer. *Epidemiology*. 1998;9(1):48-55.
82. Siemiatycki J, Boffetta P. Invited commentary - is it possible to investigate the quantitative relation between asbestos and mesothelioma in a community-based study? *American Journal of Epidemiology*. 1998;148(2):143-7.
83. Stewart PA, Stewart WF, Siemiatycki J, Heineman EF, Dosemeci M. Questionnaires for collecting detailed occupational information for community-based case control studies. *American Industrial Hygiene Association Journal*. 1998;59(1):39-44.
84. Goldberg MS, Siemiatycki J, Dewar R, Desy M, Riberdy H. Risks of developing cancer relative to living near a municipal solid waste landfill site in Montréal, Quebec, Canada. *Archives of Environmental Health*. 1999;54(4):291-6.
85. *Dumas S, Parent ME, Siemiatycki J, Brisson J. Rectal cancer and occupational risk factors: A hypothesis-generating, exposure-based case-control study. *International Journal of Cancer*. 2000;87(6):874-9.
86. Parent ME, Hua Y, Siemiatycki J. Occupational risk factors for renal cell carcinoma in Montréal. *American Journal of Industrial Medicine*. 2000;38(6):609-18.
87. Parent ME, Siemiatycki J, Fritschi L. Workplace exposures and oesophageal cancer. *Occupational & Environmental Medicine*. 2000;57(5):325-34.
88. Pohlabein H, Boffetta P, Ahrens W, Merletti F, Agudo A, Benhamou E,Siemiatycki J, et al. Occupational risks for lung cancer among nonsmokers. *Epidemiology*. 2000;11(5):532-8.
89. Weston TL, Aronson KJ, Siemiatycki J, Howe GR, Nadon L. Cancer mortality among males in relation to exposures assessed through a job-exposure matrix. *International Journal of Occupational and Environmental Health*. 2000;6(3):194-202.
90. Boffetta P, Gaborieau V, Nadon L, Parent MF, Weiderpass E, Siemiatycki J. Exposure to titanium dioxide and risk of lung cancer in a population-based study from Montréal. *Scandinavian Journal of Work, Environment and Health*. 2001;27(4):227-32.
91. Goldberg MS, Parent ME, Siemiatycki J, Desy M, Nadon L, Richardson L, et al. A case-control study of the relationship between the risk of colon cancer in men and exposures to occupational agents. *American Journal of Industrial Medicine*. 2001;39(6):531-46.
92. Parent ME, Siemiatycki J. Occupation and prostate cancer. *Epidemiologic Reviews*. 2001;23(1):138-43.
93. *Sharpe CR, Siemiatycki J. Joint effects of smoking and body mass index on prostate cancer risk. *Epidemiology*. 2001;12(5):546-51.
94. *Sharpe CR, Siemiatycki J. Case-control study of alcohol consumption and prostate cancer risk in Montréal, Canada. *Cancer Causes and Control*. 2001;12(7):589-98.
95. *Sharpe CR, Siemiatycki J, Parent MB. Activities and exposures during leisure and prostate cancer risk. *Cancer Epidemiology, Biomarkers and Prevention*. 2001;10(8):855-60.
96. Siemiatycki J. Should Canadian health care professionals support the call for a worldwide ban on asbestos? *Canadian Medical Association Journal*. 2001;164(4):495-7.

97. Camus M, Siemiatycki J, Case BW, Désy M, Richardson L, Campbell S. Risk of mesothelioma among women living near chrysotile mines versus US EPA asbestos risk model: preliminary findings. *Annals of Occupational Hygiene*. 2002;46(Suppl 1):95-8.
98. Case BW, Camus M, Richardson L, Parent M, Désy M, Siemiatycki J. Preliminary findings for pleural mesothelioma among women in the Québec chrysotile mining regions. *Annals of Occupational Hygiene*. 2002;46(Suppl 1):128-31.
99. Leffondré K, Abrahamowicz M, Siemiatycki J, *Rachet B. Modeling smoking history: a comparison of different approaches. *American Journal of Epidemiology*. 2002;156(9):813-23.
100. *Sharpe CR, Siemiatycki J. Consumption of non-alcoholic beverages and prostate cancer risk. *European Journal of Cancer Prevention*. 2002;11(5):497-501.
101. *Sharpe CR, Siemiatycki J, *Rachet B. Effects of alcohol consumption on the risk of colorectal cancer among men by anatomical subsite (Canada). *Cancer Causes and Control*. 2002;13(5):483-91.
102. *Sharpe CR, Siemiatycki JA, *Rachet BP. The effects of smoking on the risk of colorectal cancer. *Diseases of the Colon and Rectum*. 2002;45(8):1041-50.
103. Siemiatycki J. Commentary: Epidemiology on the side of the angels. *International Journal of Epidemiology*. 2002;31(5):1027-9.
104. Fritschi L, Nadon L, Benke G, Lakhani R, Latreille B, Parent ME, ...Siemiatycki J. Validation of expert assessment of occupational exposures. *American Journal of Industrial Medicine*. 2003;43(5):519-22.
105. Krewski D, Burnett RT, Goldberg MS, Abrahamowicz M, Siemiatycki J, Jerrett M, et al. Rejoinder: Reanalysis of the Harvard Six Cities Study and American Cancer Society study of particulate air pollution and mortality. *Journal of Toxicology & Environmental Health Part A*. 2003;66(16-19):1715-22.
106. Krewski D, Burnett RT, Goldberg MS, Hoover BK, Siemiatycki J, Jerrett M, et al. Overview of the reanalysis of the Harvard Six Cities Study and American Cancer Society Study of particulate air pollution and mortality. *Journal of Toxicology & Environmental Health Part A*. 2003;66(16-19):1507-51.
107. Leffondré K, Abrahamowicz M, Siemiatycki J. Evaluation of Cox's model and logistic regression for matched case-control data with time-dependent covariates: a simulation study. *Statistics in Medicine*. 2003;22(24):3781-94.
108. Leffondré K, Abrahamowicz M, Siemiatycki J, Rachet B. Re: Modeling smoking history: a comparison of different approaches. *American Journal of Epidemiology*. 2003;158(4):393-4.
109. Rachet B, Abrahamowicz M, Sasco AJ, Siemiatycki J. Estimating the distribution of lag in the effect of short-term exposures and interventions: adaptation of a non-parametric regression spline model. *Statistics in Medicine*. 2003;22(14):2335-63.
110. Siemiatycki J, Krewski D, Shi Y, Goldberg MS, Nadon L, Lakhani R. Controlling for potential confounding by occupational exposures. *Journal of Toxicology & Environmental Health Part A*. 2003;66(16-19):1591-603.
111. Rachet B, Siemiatycki J, Abrahamowicz M, Leffondré K. A flexible modeling approach to estimating the component effects of smoking behavior on lung cancer. *Journal of Clinical Epidemiology*. 2004;57(10):1076-85.
112. Siemiatycki J, Richardson L, Straif K, Latreille B, Lakhani R, Campbell S, et al. Listing occupational carcinogens; see errata: 113 (2); A 89. *Environmental Health Perspectives*. 2004;112(15):1447-59.
113. Toraason M, Albertini R, Bayard S, Bigbee W, Blair A, Boffetta P, ... Siemiatycki J, et al. Applying new biotechnologies to the study of occupational cancer - A workshop summary. *Environmental Health Perspectives*. 2004;112(4):413-6.
114. Krewski D, Burnett RT, Goldberg MS, Hoover K, Siemiatycki J, Abrahamowicz M, White WH. Validation of the Harvard Six Cities Study of particulate air pollution and mortality. *N Engl J Med*. 2004;350(2):198-9.
115. Infante-Rivard C, Siemiatycki J, Lakhani R, Nadon L. Maternal exposure to occupational solvents and childhood leukemia. *Environmental Health Perspectives*. 2005;113(6):787-92.

116. Krewski D, Burnett RT, Goldberg M, Hoover K, Siemiatycki J, Abrahamowicz M, et al. Reanalysis of the Harvard Six Cities Study, part II: sensitivity analysis. *Inhalation Toxicology*. 2005;17(7-8):343-53.
117. Krewski D, Burnett RT, Goldberg M, Hoover K, Siemiatycki J, Abrahamowicz M, et al. Reanalysis of the Harvard Six Cities Study, part I: validation and replication. *Inhalation Toxicology*. 2005;17(7-8):335-42.
118. *Rousseau MC, Parent ME, Siemiatycki J. Comparison of self-reported height and weight by cancer type among men from Montréal, Canada. *European Journal of Cancer Prevention*. 2005;14(5):431-8.
119. *Rousseau MC, Straif K, Siemiatycki J. IARC carcinogen update. *Environmental Health Perspectives*. 2005;113(9):A580-A1.
120. Siemiatycki J. Synthesizing the lifetime history of smoking. *Cancer Epidemiology, Biomarkers and Prevention*. 2005;14(10):2294-5.
121. Siemiatycki J. Opportunités et défis en épidémiologie environnementale. *Bulletin d'Information en Santé environnementale*. 2005;16(5):3.
122. Straif K, Cardis E, Boffeta P, Rousseau MC, Siemiatycki J. ELF MFs: Straif et al. respond. *Environmental Health Perspectives*. 2005;113(11):A727.
123. Baan R, Straif K, Grosse Y, Secretan W, El Ghissassi F, Coglianò V, WHO IARC Monograph Working Group. Carcinogenicity of carbon black, titanium dioxide, and talc. *Lancet Oncology*. 2006;7(4):295-6.
124. *Benedetti A, Parent ME, Siemiatycki J. Consumption of alcoholic beverages and risk of lung cancer: results from two case-control studies in Montréal, Canada. *Cancer Causes and Control*. 2006;17(4):469-80.
125. Leffondré K, Abrahamowicz M, Xiao Y, Siemiatycki J. Modelling smoking history using a comprehensive smoking index: application to lung cancer. *Statistics in Medicine*. 2006;25(24):4132-46.
126. *Ramanakumar AV, Parent ME, Menzies D, Siemiatycki J. Risk of lung cancer following nonmalignant respiratory conditions: evidence from two case-control studies in Montréal, Canada. *Lung Cancer*. 2006;53(1):5-12.
127. *Rousseau MC, Parent ME, Pollak MN, Siemiatycki J. Diabetes mellitus and cancer risk in a population-based case-control study among men from Montréal, Canada. *International Journal of Cancer*. 2006;118(8):2105-9.
128. Cardis E, Richardson L, Deltour I, Armstrong B, Feychting M, Johansen C, ... Siemiatycki J, et al. The INTERPHONE study: design, epidemiological methods, and description of the study population. *European Journal of Epidemiology*. 2007;22(9):647-64.
129. Parent ME, Rousseau MC, Boffetta P, Cohen A, Siemiatycki J. Exposure to diesel and gasoline engine emissions and the risk of lung cancer. *American Journal of Epidemiology*. 2007;165(1):53-62.
130. *Ramanakumar AV, Parent ME, Siemiatycki J. Risk of lung cancer from residential heating and cooking fuels in Montréal, Canada. *American Journal of Epidemiology*. 2007;165(6):634-42.
131. Rousseau MC, Parent ME, Nadon L, Latreille B, Siemiatycki J. Occupational exposure to lead compounds and risk of cancer among men: a population-based case-control study. *American Journal of Epidemiology*. 2007;166(9):1005-14.
132. Siemiatycki J. Investigating cancer risks related to asbestos and other occupational carcinogens. *Occupational & Environmental Medicine*. 2007;64(8):500-1.
133. Langseth H, Hankinson SE, Siemiatycki J, Weiderpass E. Perineal use of talc and risk of ovarian cancer. *Journal of Epidemiology and Community Health*. 2008;62(4):358-60.
134. *Pintos J, Parent ME, Rousseau MC, Case BW, Siemiatycki J. Occupational exposure to asbestos and man-made vitreous fibers, and risk of lung cancer: Evidence from two case-control studies in Montréal, Canada. *Journal of Occupational and Environmental Medicine*. 2008;50(11):1273-81.
135. *Ramanakumar AV, Nadon L, Siemiatycki J. Exposures in painting related occupations and risk of selected cancers: Results from a case-control study in Montréal. *American Journal of Industrial Medicine*. 2008;51(6):419-27.

136. *Ramanakumar AV, Parent ME, Latreille B, Siemiatycki J. Risk of lung cancer following exposure to carbon black, titanium dioxide and talc: results from two case-control studies in Montréal. *International Journal of Cancer*. 2008;122(1):183-9.
137. Rousseau MC, Parent M-É, Nadon L, Latreille B, Siemiatycki J. Re: Occupational exposure to lead compounds and risk of cancer among men: a population-based case-control study. *American Journal of Epidemiology*. 2008;168(10):1217-8.
138. *Benedetti A, Parent ME, Siemiatycki J. Lifetime consumption of alcoholic beverages and risk of 13 types of cancer in men: Results from a case-control study in Montréal. *Cancer Detection and Prevention*. 2009;32(5-6):352-62.
139. Koushik A, Parent ME, Siemiatycki J. Characteristics of menstruation and pregnancy and the risk of lung cancer in women. *International Journal of Cancer*. 2009;125(10):2428-33.
140. Parent ME, Désy M, Siemiatycki J. Does exposure to agricultural chemicals increase the risk of prostate cancer among farmers? *McGill Journal of Medicine*. 2009;12(1):70-7.
141. Pintos J, Parent ME, Case BW, Rousseau MC, Siemiatycki J. Risk of mesothelioma and occupational exposure to asbestos and man-made vitreous fibers: evidence from two case-control studies in Montréal, Canada. *Journal of Occupational and Environmental Medicine*. 2009;51(10):1177-84.
142. Straif K, Benbrahim-Tallaa L, Baan R, Grosse Y, Secretan B, El Ghissassi F, WHO IARC Monograph Working Group. A review of human carcinogens--part C: metals, arsenic, dusts, and fibres. *Lancet Oncology*. 2009;10(5):453-4.
143. Vrijheid M, Armstrong BK, Bedard D, Brown J, Deltour I, Iavarone I, ... Richardson L, ... Siemiatycki J, et al. Recall bias in the assessment of exposure to mobile phones. *Journal of Exposure Science & Environmental Epidemiology*. 2009;19(4):369-81.
144. Vrijheid M, Richardson L, Armstrong BK, Auvinen A, Berg G, Carroll M, ... Siemiatycki J, et al. Quantifying the impact of selection bias caused by nonparticipation in a case-control study of mobile phone use. *Annals of Epidemiology*. 2009;19(1):33-41.
145. *Beveridge R, Pintos J, Parent ME, Asselin J, Siemiatycki J. Lung cancer risk associated with occupational exposure to nickel, chromium VI, and cadmium in two population-based case-control studies in Montréal. *American Journal of Industrial Medicine*. 2010;53(5):476-85.
146. El-Zein M, Parent ME, Ka K, Siemiatycki J, St-Pierre Y, Rousseau MC. History of asthma or eczema and cancer risk among men: a population-based case-control study in Montréal, Quebec, Canada. *Annals of Allergy, Asthma, and Immunology*. 2010;104(5):378-84.
147. Leffondre K, Wynant W, Cao ZR, Abrahamowicz M, Heinze G, Siemiatycki J. A weighted Cox model for modelling time-dependent exposures in the analysis of case-control studies. *Statistics in Medicine*. 2010;29(7-8 Special Issue SI):839-50.
148. *Momoli F, Abrahamowicz M, Parent ME, Krewski D, Siemiatycki J. Analysis of multiple exposures: an empirical comparison of results from conventional and semi-bayes modeling strategies. *Epidemiology*. 2010;21(1):144-51.
149. The INTERPHONE Study Group. Brain tumour risk in relation to mobile telephone use: results of the INTERPHONE international case-control study. *International Journal of Epidemiology*. 2010;39(3):675-94.
150. *Vida S, Pintos J, Parent ME, Lavoué J, Siemiatycki J. Occupational exposure to silica and lung cancer: pooled analysis of two case-control studies in Montréal, Canada. *Cancer Epidemiology, Biomarkers and Prevention*. 2010;19(6):1602-11.
151. Ward EM, Schulte PA, Straif K, Hopf NB, Caldwell JC, Carreon T, ... Siemiatycki J, et al. Research recommendations for selected IARC-classified agents. *Environmental Health Perspectives*. 2010;118(10):1355-62.
152. Baan R, Grosse Y, Lauby-Secretan B, El Ghissassi F, Bouvard V, Benbrahim-Tallaa L, IARC Monograph Working Group. Carcinogenicity of radiofrequency electromagnetic fields. *Lancet Oncology*. 2011;12(7):624-6.

153. Nkosi TM, Parent ME, Siemiatycki J, Pintos J, Rousseau MC. Comparison of indicators of material circumstances in the context of an epidemiological study. *BMC Medical Research Methodology*. 2011;11:108.
154. Olsson AC, Gustavsson P, Kromhout H, Peters S, Vermeulen R, Bruske I, ... Siemiatycki J, Pintos J, et al. Exposure to diesel motor exhaust and lung cancer risk in a pooled analysis from case-control studies in Europe and Canada. *American Journal of Respiratory and Critical Care Medicine*. 2011;183(7):941-8.
155. Olsson AC, Vermeulen R, Kromhout H, Peters S, Gustavsson P, Bruske I, Siemiatycki J, Pesch B, Bruning T. Rejoinder to Commentary on Exposure to diesel motor exhaust and lung cancer by Bunn and Hesterberg. *American Journal of Respiratory and Critical Care Medicine*. 2011;184: 2010-2011.
156. Parent ME, Rousseau MC, El-Zein M, Latreille B, Desy M, Siemiatycki J. Occupational and recreational physical activity during adult life and the risk of cancer among men. *Cancer Epidemiology*. 2011;35(2):151-9.
157. *Ramanakumar AV, Parent ME, Richardson L, Siemiatycki J. Exposures in painting-related occupations and risk of lung cancer among men: results from two case-control studies in Montréal. *Occupational & Environmental Medicine*. 2011;68(1):44-51.
158. Soskolne CL, Jhangri GS, Scott HM, Brenner DR, Siemiatycki J, Lakhani R, et al. A population-based case-control study of occupational exposure to acids and the risk of lung cancer: evidence for specificity of association. *International Journal of Occupational and Environmental Health*. 2011;17(1):1-8.
159. *Christensen KY, Naidu A, Parent ME, Pintos J, Abrahamowicz M, Siemiatycki J, et al. The risk of lung cancer related to dietary intake of flavonoids. *Nutrition & Cancer-An International Journal*. 2012;64(7):964-74.
160. Labreche F, Case BW, Ostiguy G, Chalaoui J, Camus M, Siemiatycki J. Pleural mesothelioma surveillance: validity of cases from a tumour registry. *Canadian Respiratory Journal*. 2012;19(2):103-7.
161. Lavoué J, Pintos J, Van Tongeren M, Kincl L, Richardson L, Kauppinen T, ... Siemiatycki J. Comparison of exposure estimates in the Finnish job-exposure matrix FINJEM with a JEM derived from expert assessments performed in Montréal. *Occupational & Environmental Medicine*. 2012;69(7):465-71.
162. Nadalin V, Kreiger N, Parent ME, Salmoni A, Sass-Kortsak A, Siemiatycki J, et al. Prostate cancer and occupational whole-body vibration exposure. *Annals of Occupational Hygiene*. 2012;56(8):968-74.
163. Nkosi TM, Parent ME, Siemiatycki J, Rousseau MC. Socioeconomic position and lung cancer risk: how important is the modeling of smoking? *Epidemiology*. 2012;23(3):377-85.
164. Olsson A, Vermeulen R, Kromhout H, Peters S, Gustavsson P, Bruske I, Siemiatycki J, et al. The impact of selection bias due to increasing response rates among population controls in occupational case-control studies: response. *American Journal of Respiratory and Critical Care Medicine*. 2012;185(1):106-7.
165. Parent ME, El-Zein M, Rousseau MC, Pintos J, Siemiatycki J. Night work and the risk of cancer among men. *American Journal of Epidemiology*. 2012;176(9):751-9.
166. Parent ME, El-Zein M, Rousseau MC, Pintos J, Siemiatycki J. Parent et al. Respond to "shift work and cancer". *American Journal of Epidemiology*. 2012;176(9):764-5.
167. Pesch B, Kendzia B, Gustavsson P, Jockel KH, Johnen G, Pohlabein H, ... Siemiatycki J, et al. Cigarette smoking and lung cancer-relative risk estimates for the major histological types from a pooled analysis of case-control studies. *International Journal of Cancer*. 2012;131(5):1210-9.
168. Peters S, Kromhout H, Olsson AC, Wichmann HE, Bruske I, Consonni D, ... Siemiatycki J, et al. Occupational exposure to organic dust increases lung cancer risk in the general population. *Thorax*. 2012;67(2):111-6.
169. Pintos J, Parent ME, Richardson L, Siemiatycki J. Occupational exposure to diesel engine emissions and risk of lung cancer: evidence from two case-control studies in Montréal, Canada. *Occupational & Environmental Medicine*. 2012;69(11):787-92.
170. *Vallièrès E, Pintos J, Lavoué J, Parent ME, Rachet B, Siemiatycki J. Exposure to welding fumes increases lung cancer risk among light smokers but not among heavy smokers: evidence from two case-control studies in Montréal. *Cancer Medicine*. 2012;1(1):47-58.

171. *Al-Zoughool M, Pintos J, Richardson L, Parent ME, Ghadirian P, Krewski D. Exposure to environmental tobacco smoke (ETS) and risk of lung cancer in Montréal: a case-control. *Environmental Health*. 2013;12(112):1-8.
172. Behrens T, Kendzia B, Treppmann T, Olsson A, Jockel KH, Gustavsson P, ... Siemiatycki J, et al. Lung cancer risk among bakers, pastry cooks and confectionary makers: the SYNERGY study. *Occupational & Environmental Medicine*. 2013;70(11):810-4.
173. *Christensen KY, *Vizcaya D, Richardson H, Lavoué J, Aronson K, Siemiatycki J. Risk of selected cancers due to occupational exposure to chlorinated solvents in a case-control study in Montréal. *Journal of Occupational and Environmental Medicine*. 2013;55(2):198-208.
174. El-Zein M, Parent ME, Nicolau B, Koushik A, Siemiatycki J, Rousseau MC. Body mass index, lifetime smoking intensity and lung cancer risk. *International Journal of Cancer*. 2013;133(7):1721-31.
175. Kendzia B, Behrens T, Jockel KH, Siemiatycki J, Kromhout H, Vermeulen R, et al. Welding and lung cancer in a pooled analysis of case-control studies. *American Journal of Epidemiology*. 2013;178(10):1513-25.
176. *Lacourt A, Cardis E, Pintos J, Richardson L, Kincl L, Benke G, et al. INTEROCC case-control study: lack of association between glioma tumors and occupational exposure to selected combustion products, dusts and other chemical agents - art. no. 340. *BMC Public Health*. 2013;13(340):12.
177. *Mahboubi A, Koushik A, Siemiatycki J, Lavoué J, Rousseau MC. Assessment of the effect of occupational exposure to formaldehyde on the risk of lung cancer in two Canadian population-based case-control studies. *Scandinavian Journal of Work, Environment and Health*. 2013;39(4):401-10.
178. Olsson AC, Xu YW, Schuz J, Vlaanderen J, Kromhout H, Vermeulen R, ... Siemiatycki J, Richardson L, et al. Lung cancer risk among hairdressers: a pooled analysis of case-control studies conducted between 1985 and 2010. *American Journal of Epidemiology*. 2013;178(9):1355-65.
179. Turner MC, Krewski D, Armstrong BK, Chetrit A, Giles GG, Hours M, ... Siemiatycki J, et al. Allergy and brain tumors in the INTERPHONE study: pooled results from Australia, Canada, France, Israel, and New Zealand. *Cancer Causes and Control*. 2013;24(5):949-60.
180. van Tongeren M, Kincl L, Richardson L, Benke G, Figuerola J, Kauppinen T, ... Lavoué J, ... The INTEROCC Study Group. Assessing occupational exposure to chemicals in an international epidemiological study of brain tumours. *Annals of Occupational Hygiene*. 2013;57(5):610-26.
181. *Vizcaya D, *Christensen KY, Lavoué J, Siemiatycki J. Risk of lung cancer associated with six types of chlorinated solvents: results from two case-control studies in Montréal, Canada. *Occupational & Environmental Medicine*. 2013;70(2):81-5.
182. *Wynant W, Siemiatycki J, Parent ME, Rousseau MC. Occupational exposure to lead and lung cancer: results from two case-control studies in Montréal, Canada. *Occupational & Environmental Medicine*. 2013;70(3):164-70.
183. Parent ME, El-Zein M, Rousseau MC, Pintos J, Siemiatycki J. Re: "night work and the risk of cancer among men" reply. *American Journal of Epidemiology*. 2013;177(10):1166-7.
184. El-Zein M, Parent ME, Siemiatycki J, Rousseau MC. History of allergic diseases and lung cancer risk. *Annals of Allergy, Asthma, and Immunology*. 2014;112(3):230-6.
185. McLean D, Fleming S, Turner MC, Kincl L, Richardson L, Benke G, ... Siemiatycki J, et al. Occupational solvent exposure and risk of meningioma: results from the INTEROCC multicentre case-control study. *Occupational & Environmental Medicine*. 2014;71(4):253-8.
186. Siemiatycki J, Karp I, Sylvestre MP, Pintos J. Estimating the proportion of cases of lung cancer legally attributable to smoking: a novel approach for class actions against the tobacco industry. *American Journal of Public Health*. 2014;104(8):e60-e6.
187. Turner MC, Benke G, Bowman JD, Figuerola J, Fleming S, Hours M, ... Richardson L, ... Siemiatycki J, et al. Occupational exposure to extremely low-frequency magnetic fields and brain tumor risks in the INTEROCC study. *Cancer Epidemiology, Biomarkers and Prevention*. 2014;23(9):1863-72.

188. *Vida S, Richardson L, Cardis E, Krewski D, McBride M, Parent ME, ... Siemiatycki J. Brain tumours and cigarette smoking: analysis of the INTERPHONE Canada case-control study. *Environmental Health*. 2014;13:55.
189. Vlaanderen J, Portengen L, Schuz J, Olsson A, Pesch B, Kendzia B, ... Siemiatycki J, et al. Effect modification of the association of cumulative exposure and cancer risk by intensity of exposure and time since exposure cessation: a flexible method applied to cigarette smoking and lung cancer in the SYNERGY study. *American Journal of Epidemiology*. 2014;179(3):290-8.
190. Denholm R, Schuz J, Straif K, Stucker I, Jockel KH, Brenner DR, ... Siemiatycki J, et al. Is previous respiratory disease a risk factor for lung cancer? *American Journal of Respiratory and Critical Care Medicine*. 2014;190(5):549-59.
191. Vila J, Bowman JD, Kincl L, Conover DL, van Tongeren M, Figuerola J, Richardson L, Cardis E and INTEROCC Study Group. Development of a source-based approach to assessing occupational exposure to electromagnetic fields in the INTEROCC study [abstract]. *Occupational & Environmental Medicine*. 2014;71 (Suppl 1): A35-A36.
192. Bigert C, Gustavsson P, Straif K, Pesch B, Bruning T, Kendzia B, ... Siemiatycki J, et al. Lung cancer risk among cooks when accounting for tobacco smoking: a pooled analysis of case-control studies from Europe, Canada, New Zealand, and China. *Journal of Occupational and Environmental Medicine*. 2015;57(2):202-9.
193. *Valli res E, Pintos J, Parent ME, Siemiatycki J. Occupational exposure to wood dust and risk of lung cancer in two population-based case-control studies in Montr al, Canada. *Environmental Health*. 2015;14(1):1-9.
194. *Christensen K Y, Lavou  J, Rousseau M-C, Siemiatycki J. Lack of a protective effect of cotton dust on risk of lung cancer: evidence from two population-based case-control studies. *BMC Cancer*. 2015;15: 212.
195. Consonni D, De Matteis S, Pesatori AC, Bertazzi PA, Olsson AC, Kromhout H, ... Siemiatycki J, et al. Lung cancer risk among bricklayers in a pooled analysis of case-control studies. *International Journal of Cancer*. 2015;136(2):360-71.
196. Pearce NE, Blair A, Vineis P, Ahrens W, Andersen A, Anto JM, ... Siemiatycki J, et al. IARC Monographs: 40 Years of Evaluating Carcinogenic Hazards to Humans. *Environ Health Perspect* 2015;(6):507-14.
197. Pesch B, Kendzia B, Hauptmann K, Van Gelder R, Stamm R, ... Siemiatycki J, Lavou  J, J ckel KH, Br ning T. Airborne exposure to inhalable hexavalent chromium in welders and other occupations: Estimates from the German MEGA database. *International journal of hygiene and environmental health*. 2015;218(5):500-06.
198. Taeger D, Pesch B, Kendzia B, Behrens T, ... Siemiatycki J, et al. Lung Cancer among Coal Miners, Ore Miners and Quarrymen - Smoking-adjusted Risk Estimates from the Synergy Pooled Analysis of Case-Control Studies. *Scandinavian Journal of Work, Environment and Health*. 2015;July.
199. *Lacourt A, Lavou  J, Pintos J, Siemiatycki J. Lung cancer risk in the construction industry: results from two case-control studies in Montr al. *BMC Public Health*. 2015;15:941. doi: 10.1186/s12889-015-2237-9.
200. *Liu A, Abrahamowicz M, Siemiatycki J. Conditions for confounding of interactions. *Pharmacoepidemiology & Drug Safety*. 2015;25(3):287-296.
201. Bigert C, Gustavsson P, Straif K, Taeger D, Pesch B, Kendzia B, ... Siemiatycki J, Lavou  J, et al. Lung cancer risk among firefighters when accounting for tobacco smoking – preliminary results from a pooled analysis of case-control studies from Europe, Canada, New Zealand and China. *Journal of Occupational and Environmental Medicine*. Sep 2016, 73 (Suppl 1) A128; DOI: 10.1136/oemed-2016-103951.350
202. Vila J, Bowman JD, Richardson L, Kincl L, Conover DL, McLean D, Mann S, Vecchia P, van Tongeren M, Cardis E and INTEROCC Study Group. A Source-based Measurement Database for Occupational Exposure Assessment of Electromagnetic Fields in the INTEROCC Study: A Literature Review Approach. *Annals of Occupational Hygiene*. 2016;60(2):184-204. doi:10.1093/annhyg/mev076
203. * Kirkham TL, Siemiatycki J, Labreche F, Lavou  J. Impact of aggregating exposure information from cases and controls when building a population-based job-exposure matrix from past expert evaluations. *Occupational & Environmental Medicine*. 2016;73(7):474-481. doi:10.1136/oemed-2014-102690

204. Karp I, Sylvestre MP, Abrahamowicz M, Leffondre K, Siemiatycki J. Bridging the etiologic and prognostic outlooks in individualized assessment of absolute risk of an illness: application in lung cancer. *European Journal of Epidemiology*. 2016;1-9. doi 10.1007/s10654-016-0180-4.
205. *Carrier M, Apparicio P, Kestens Y, Ségin A-M, Pham H, Crouse D, Siemiatycki J. Application of a global environmental equity index in Montréal: diagnostic and further implications. *Annals of the American Association of Geographers*. 2016;106(6),1268-1285.
206. Behrens T, Gross I, Siemiatycki J, Conway D.I, Olsson A, Stücker I, et al. Occupational prestige, social mobility and the association with lung cancer in men. *BMC Cancer*. 2016;16:395. doi: 10.1186/s12885-016-2432-9
207. Vila J, Bowman JD, Figuerola J, Moriña D, Kincl L, Richardson L, Cardis E, and the INTEROCC Study Group, on behalf of the CREAL. Development of a source-exposure matrix for occupational exposure assessment of electromagnetic fields in the INTEROCC study. *Journal of Exposure Science and Environmental Epidemiology*. 2016;Nov 9. doi:10.1038/jes.2016.60.
208. Turner M, Sadetzki S, Langer CE, Villegas R, ... Parent ME, Richardson L, Siemiatycki J, et al. Investigation of bias related to differences between case and control interview dates in five INTERPHONE countries. *Annals of Epidemiology*. 2016;26:827-832.
209. *Pasquet R, Karp I, Siemiatycki J, Koushik A. The consumption of coffee and black tea and the risk of lung cancer. *Annals of Epidemiology*. 2016;26:757-763.e2.
210. Grell K, Frederiksen K, Schuz J, Cardis E, Armstrong B, Siemiatycki J, et al. The Intracranial Distribution of Gliomas in Relation to Exposure From Mobile Phones: Analyses From the INTERPHONE Study. *American Journal of Epidemiology*. 2016;184:818-828.
211. Sadetzki S, Turner MC, Figuerola J, ... Parent ML, Richardson L, Siemiatycki J, et al. Occupational exposure to metals and risk for meningioma: a multinational case-control study. *Journal of Neuro-Oncology*. 2016;130(3):505-515.
212. Bigert C, Gustavsson P, Straif K, Taeger D, ..., Siemiatycki J, et al. Lung Cancer Among Firefighters: Smoking-Adjusted Risk Estimates in a Pooled Analysis of Case-Control Studies. *Journal of Occupational Environmental Medicine*. 2016;58(11):1137-43.
213. Zeng F, Lerro C, Lavoué J, Huang H, Siemiatycki J, Zhao N, et al. Occupational exposure to pesticides and other biocides and risk of thyroid cancer. *Occupational Environmental Medicine*. 2017 Feb 15:oemed-2016.
214. Kendzia B, Pesch B, Koppisch D, Van Gelder R, Pitzke K, ... Siemiatycki J, Lavoué J, et al. Modelling of occupational exposure to inhalable nickel compounds. *Journal of Exposure Science and Environmental Epidemiology*. 2017 Jul;27(4):427-433. doi: 10.1038/jes.2016.80.
215. Shareck M, Rousseau MC, Koushik A, Siemiatycki J, Parent ME. Inverse association between dietary intake of selected carotenoids and vitamin C and risk of lung cancer. *Frontiers in Oncology*. 2017Feb 27;7:23 doi: 10.3389/fonc.2017.00023.
216. Olsson AC, Vermeulen R, Schüz J, Kromhout H, Pesch B, ... Siemiatycki J, Parent ME, et al. Exposure-Response Analyses of Asbestos and Lung Cancer Subtypes in a Pooled Analysis of Case-Control Studies. *Epidemiology*. 2017 Mar;28(2):288-299.
217. Oraby T, Sivaganesan S, Bowman JD, Kincl L, Richardson L, McBride M, Siemiatycki J, Cardis E, Krewski D. Berkson error adjustment and other exposure surrogates in occupational case-control studies, with application to the Canadian INTEROCC study. *Journal of Exposure Science and Environmental Epidemiology*, March 29 2017; doi: 10.1038/jes.2017.2. Advance online publication
218. Blanc-Lapierre A, Rousseau MC, Weiss D, El-Zein M, Siemiatycki J, Parent ME. Lifetime report of perceived stress at work and risk of cancer among men: a case-control study in Montréal, Canada. *Preventive Medicine*. 2017 Mar 31;96:28-35.
219. *Xu M, Richardson L, Campbell S, Pintos J, Siemiatycki J. Patterns and trends in quality of response rate reporting in case-control studies of cancer. *Journal of Epidemiological Research*; 2017 Mar 31;3(2):13.
220. *Ho V, Parent ME, Pintos J, Abrahamowicz M, ... Gauvin L, Siemiatycki J, Koushik A. Physical activity and lung cancer risk in men and women. *Cancer Causes and Control*. 2017 Apr;28(4):309-318.

221. Fehringer G, Brenner DR, ... Siemiatycki J, Koushik A, ... Olsson A, Straif K, Hung RJ, et al. Alcohol and Lung Cancer Risk Among Never Smokers: A Pooled Analysis from the International Lung Cancer Consortium and the SYNERGY Study. *International Journal of Cancer*. 2017 May 1;140(9):1976-1984.
222. Koushik A, Grundy A, ... Mes-Masson AM, Parent MP, Provencher D, Richardson L, Siemiatycki J. Hormonal and reproductive factors and the risk of ovarian cancer. *Cancer Causes Control*. May 2017;28(5):393-403.
223. Auger N, Siemiatycki J, Bilodeau-Bertrand M, Healy-Profittós J, Kosatsky T. Ambient Temperature and Risk of Preeclampsia: Biased association? *Paediatric and Perinatal Epidemiology*. 2017 May 2;31(4):251-384.
224. Turner M, ... Parent M-E, ... Richardson L, Siemiatycki J, et al. Interactions between occupational exposure to extremely low frequency magnetic fields and chemicals for brain tumor risk in the INTEROCC study. *Occupational Environmental Medicine*. 2017 June 9.
225. Ben Khedher S, Neri M, Papadopoulos A, Christiani DC, Diao N, ... Koushik A, Siemiatycki J, et al. Menstrual and reproductive factors and lung cancer risk: a pooled analysis from the International Lung Cancer consortium. *International Journal of Cancer*. 2017 Jul 15;141(2):309-323. doi: 10.1002/ijc.30750.
226. Parent M-É, Turner M, Lavoué J, ... Richardson L, Benke G, ... Siemiatycki J, van Tongeren M, Cardis E. Lifetime occupational exposure to metals and welding fumes, and risk of glioma: a 7-country population-based case-control study. *Environmental Health*. 2017 Aug 25;16(1):90.
227. Benke G, Turner MC, Fleming S, Figuerola J, ... Richardson L, ... Parent ME, Sadetzki S, Siemiatycki J, et al. Occupational solvent exposure and risk of glioma in the INTEROCC study. *British Journal of Cancer*. 2017 Oct 10;117(8):1246-1254. doi: 10.1038/bjc.2017.285.
228. El Zoghbi M, Salameh P, Stücker I, Paris C, Pairon JC, ... Siemiatycki J, ... Lacourt A. Phenotypes of Lung Cancer and Statistical Interactions between Tobacco Smoking and Occupational Exposure to Asbestos and Crystalline Silica from a Large Case-only Study: The CaProMat Study. *Lung Cancer*. 2017;112(Oct):140-155.
229. Momoli F, Siemiatycki J, McBride M, Parent M-É, Richardson L, Bédard D, et al. Probabilistic Multiple-Bias Modelling Applied to the Canadian Data From the Interphone Study of Mobile Phone Use and Risk of Glioma, Meningioma, Acoustic Neuroma, and Parotid Gland Tumors. *American Journal of Epidemiology*. 2017 October;186(7):885-893. doi.org/10.1093/aje/kwx157.
230. El Zoghbi M, Salameh P, Stücker I, Paris C, Pairon JC, ... Siemiatycki J, ... Lacourt A. Prevalence of occupational exposure to asbestos and crystalline silica according to phenotypes of lung cancer from the CaProMat study: A case-only study. *American Journal of Industrial Medicine*. 2018 January;61(1):85-99. 10.1002/ajim.22765.
231. Burstyn I, Gustafson P, Pintos J, Lavoué J, Siemiatycki J. Correction of odds ratios in case-control studies for exposure misclassification with partial knowledge of the degree of agreement among experts who assessed exposures. *Occupational Environmental Medicine*. 2018 Feb(2):155-159. doi: 10.1136/oemed-2017-104609.
232. McElvenny DM, ... Parent ME, ... Richardson L, Siemiatycki J, et al. The INTEROCC case-control study: risk of meningioma and occupational exposure to selected combustion products, dusts and other chemical agents. *Occupational Environmental Medicine*. 2017 December 13;75:12–22.
233. *Xu M, Siemiatycki J, Lavoué J, Pasquet R, Pintos J, Rousseau M.C, Richardson L, Ho V. Occupational exposures to leaded and unleaded gasoline engine emissions and lung cancer risk. *Occupational and Environmental Medicine*. 2018; 75(4):303-309.
234. Hovanec J, Siemiatycki J, Conway DI, Olsson A, Stücker I, Guida F, et al. (2018) Lung cancer and socioeconomic status in a pooled analysis of case-control studies. *PLoS ONE*. 2018 February 20. 13(2): e0192999. doi.org/10.1371/journal.pone.0192999.
235. Behrens T, Hovanec J, Siemiatycki J, et al. 1232 Lung cancer and occupational social status: the synergy study. *Occupational Environmental Medicine*. 2018;75(Suppl 2):A1–A650.
236. *Warden H, Richardson H, Richardson L, Siemiatycki J, Ho V. Associations between occupational exposure to benzene, toluene and xylene and risk of lung cancer in Montréal *Occup Environ Med* Published Online First: 15 May 2018. doi: 10.1136/oemed-2017-104987

237. *Rémen T, Richardson L, Pilorget C, Palmer G, Siemiatycki J, Lavoué J. Development of a coding and crosswalk tool for occupations and industries. *Annals of Work Exposures and Health*. June 15 2018. doi.org/10.1093/annweh/wxy052.
238. *Sauvé JF, Siemiatycki J,... Richardson L, Pintos J,...*Rémen T, *Pasquet R,... Lavoué J. Development of and selected performance characteristics of CANJEM, a general population job exposure matrix based on past expert assessments of exposure. *Annals of Work Exposures and Health*. 12 June 2018. doi.org/10.1093/annweh/wxy044.
239. *Xu M, Richardson L, Campbell S, Pintos J, Siemiatycki J. Response rates in case-control studies of cancer by era of fieldwork and by characteristics of study design. *Annals of Epidemiology*. 2018 June;28(6):385-391.
240. Wiernik E, Czernichow S,... Limosin F,... Zins M, Siemiatycki J, Goldberg M, et al. Cardiovascular risk goes up as your mood goes down: interaction of depression and socioeconomic status in determination of cardiovascular risk in the CONSTANCES cohort. *International Journal of Cardiology*. 2018 1 July; 262: 99-105.
241. Siemiatycki J & Lavoué J. Availability of a New Job-Exposure Matrix (CANJEM) for Epidemiologic and Occupational Medicine Purposes. *J Occupational Environmental Medicine*. 2018 July;60(7):e324-e328
242. Vila J, Turner M, Gracia-Lavedan E,... Richardson L,... Siemiatycki J, van Tongeren M, Cardis E. Occupational exposure to high-frequency electromagnetic fields and brain tumour risk in the INTEROCC study: An individualized assessment approach. *Environment International*. 2018 October;119:353-365. [Epub ahead of print]
243. Nicolau B, Arekunnath Madathil S, Castonguay G, Rousseau MC, Parent ME, & Siemiatycki J. Shared social mechanisms underlying the risk of nine cancers: A life course study. *International Journal of Cancer*. 2018 July 7.
244. *Lacourt A, Labrèche F, Goldberg M, Siemiatycki J, Lavoué J. Agreement in Occupational Exposures Between Men and Women Using Retrospective Assessments by Expert Coders. *Annals of Work Exposure and Health*. 2018 August 16.
245. Brenner DR, Fehringer G, Zhang ZF,... Siemiatycki J, Koushik A,...Straif K. Alcohol consumption and lung cancer risk: A pooled analysis from the International Lung Cancer Consortium and the SYNERGY study. *Cancer Epidemiology*. 2018. In press.

* First author was under supervision of J. Siemiatycki when this work was carried out.

BOOK CHAPTERS (invited) AND IARC MONOGRAPHS

1. Siemiatycki, J, Gérin M, Hubert J. Exposure-based case control approach to discovering occupational carcinogens: preliminary findings. Banbury Report 9. Quantification of Occupational Cancer. Eds Peto R, Schneiderman M. Cold Spring Harbor, Cold Spring Harbor Laboratory: 471-483, 1981.
2. Siemiatycki, J. Discovering occupational carcinogens with epidemiologic data. In *Chemical Mutagenesis, Human Population Monitoring, and Genetic Risk Assessment*. eds. K. C. Bora, G. R. Douglas and E. R. Nestmann. New York, Elsevier Biomedical Press: 99-105, 1982.
3. Gerin M, Siemiatycki J, Richardson L, Pellerin J, Lakhani R, Dewar R. Nickel and cancer associations from a multicancer occupation exposure case-referent study: preliminary findings. In *Nickel in the Human Environment*. Eds F. W. Sunderman, Jr. Lyon, International Agency for Research on Cancer: 105-115., 1984.
4. Siemiatycki J. An epidemiologic approach to discovering occupational carcinogens by obtaining better information on occupational exposures. In: *Recent Advances in Occupational Health*. Ed. MJ Harrington, Churchill Livingstone Vol. 2, pp. 143-157, 1984.
5. Siemiatycki J. Discovering occupational carcinogens in population-based case-control studies: Review of findings from an exposure-based approach and a methodologic comparison of alternative data collection

- strategies. In: Occupational Cancer Epidemiology, Ed. P Band, Springer-Verlag Press. Berlin. 25-38, 1990.
6. Krewski, D, Siemiatycki J, Nadon L, Dewar R, and Gérin M. Cancer risks due to occupational exposure to polycyclic aromatic hydrocarbons: a preliminary report. In Genetic Toxicology of Complex Mixtures. Eds M.D. Waters, F.B. Daniel, J.Lewtas, M.M. Moore and S. Newnow. New York, Plenum Press: 343-352, 1990.
 7. Siemiatycki, J., M. Gérin, R. Dewar, R. Lakhani, D. Bégin and L. Richardson. Silica and cancer associations from a multicancer occupational exposure case-referent study. In Occupational Exposure to Silica and Cancer Risk. Eds L. Simonato, A. C. Fletcher, R. Saracci and T. L. Thomas. Lyon, International Agency for Research on Cancer: 29-42, 1990.
 8. IARC Working Group (21 co-authors) (1991). IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, Vol. 52. Chlorinated drinking-water; chlorination by-products; some other halogenated compounds; cobalt and cobalt compounds. Lyon, IARC (International Agency for Research on Cancer).
 9. Siemiatycki, J. Risk factors for cancer in the occupational environment and relevant epidemiologic study methods. In Introduction to Environmental Epidemiology. Eds E. Talbott and G. Craun. Boca Raton, Lewis Publishers: 99-122, 1995.
 10. IARC Working Group (17 co-authors) (1996). IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, Vol. 65. Printing processes and printing inks, carbon black and some nitro compounds. Lyon, IARC (International Agency for Research on Cancer).
 11. Siemiatycki J. Job-exposure matrices. In: Encyclopedia of Biostatistics, eds. P Armitage and T Colton. Wiley, 1998.
 12. Siemiatycki J. Job-exposure matrices. In: Encyclopedia of Epidemiologic Methods, eds. MH Gail and J Benichou. Wiley, 2000.
 13. Siemiatycki J, Richardson L, Boffetta P. Occupation. In: Cancer Epidemiology and Prevention, 3rd Ed, eds. D Schottenfeld and J Fraumeni, Oxford University Press, 2006.
 14. IARC Monograph Working Group. IARC Monographs on the Evaluation of Carcinogenic Risks to Humans Vol. 93 - Carbon black, titanium dioxide and non-asbestiform talc, IARC (International Agency for Research on Cancer), Lyon, 2009.
 15. Siemiatycki J. Les règles, les pratiques et les préjugés des comités d'éthique vont réduire notre capacité à prévenir les maladies et à sauver des vies in La malréglementation, Une éthique de la recherche est-elle possible et à quelles conditions? Sous la direction de Michèle S. Jean et Pierre Trudel. Les Presses de l'Université de Montréal 2010.
 16. IARC (2010). IARC Technical Publication No. 42: Identification of research needs to resolve the carcinogenicity of high-priority IARC carcinogens.
<http://monographs.iarc.fr/ENG/Publications/techrep42/index.php>
 17. IARC Monograph Working Group. IARC Monographs on the Evaluation of Carcinogenic Risks to Humans Vol. 100 – A review of human carcinogens, part C: metals, arsenic, dusts and fibres, IARC (International Agency for Research on Cancer), Lyon, 2012.
 18. IARC Monograph Working Group. IARC Monographs on Evaluation of Carcinogenic Risks to Humans Vol. 102 – Radio Frequency Fields 2011, IARC (International Agency for Research on Cancer), Lyon, 2013.
 19. Siemiatycki J. Occupational exposures, Chapter 2.6. In IARC World Cancer Report. Eds B Stewart, C Wild. Lyon 2013.
 20. Siemiatycki J. Historical overview of occupational cancer research and control. In Occupational Cancers. Eds S Anttila, P Boffetta, K Straif. Springer Press: 1-20, 2014.

PUBLICATIONS WITHOUT PEER REVIEW, OTHER SCIENTIFIC REPORTS

1. Rossiter CE, Bristol LJ, Cartier PH, Gibbs GW, Gilson JC, Grainger TR, Siemiatycki J, Sluis-Cremer GK, McDonald JC. Dust exposure and radiographic appearances in Quebec asbestos workers. XVI International Congress on Occupational Health, Tokyo: 205-206, 1969.
2. Siemiatycki J. Living conditions and health - with special reference to low income areas of Montréal. Report submitted to the Pointe St-Charles Community Clinic, 42 pp, 1972.

3. Siemiatycki J. The distribution of disease. Canadian Dimension. 1975.
4. Siemiatycki J, Richardson L. Les facteurs socio-économiques et l'utilisation des services de santé à Montréal: document de travail. Submitted to the Ministère des Affaires sociales, 1979.
5. Siemiatycki J, Richardson L. Les corrélatifs sociaux de la morbidité tels qu'ils ressortent d'une enquête sur la santé menée à Montréal: rapport préliminaire. Submitted to the Ministère des Affaires sociales, 1979.
6. Siemiatycki J. Les facteurs qui déterminent la consommation de médicaments obtenus par prescription et les facteurs associés aux affections chroniques: rapport préliminaire. Submitted to the Ministère des Affaires sociales, 1979.
7. Groupe d'étude de la fonction épidémiologique. (Aubry F, Drouin L, Ducharme G, Fredette JM, Lance JM, Siemiatycki J.) La fonction épidémiologique à la Commission de Santé et Sécurité au travail. Submitted to the Direction des Programmes et Normes, Commission de Santé et Sécurité au Travail, Québec, 1980.
8. Siemiatycki J. An exposure-based case-control method for discovering occupational carcinogens. Chronic Diseases in Canada, 1:21-24, 1980.
9. Siemiatycki J, Richardson L. Les corrélatifs sociaux de la morbidité tels qu'ils ressortent d'une enquête sur la santé à Montréal. Submitted to the Ministère des Affaires Sociales, 1981.
10. Siemiatycki J. La consommation de médicaments à Montréal selon les facteurs démographiques, économiques, et ethniques. Submitted to the Ministère des Affaires Sociales, 1981.
11. Siemiatycki J. Mortality in the general population in asbestos mining areas. Proceedings of the World Symposium on Asbestos, Montréal, 337-348, 1982.
12. Price P, Gerin M, Siemiatycki J. An annotated bibliography of sources of information on occupational exposures. pp.78, 1982.
13. Gerin M, Siemiatycki J, Kemper H, Laroche L, Millet C. Translating job histories into histories of occupational exposure for epidemiologic purpose. Proceedings of the Medical Research Council Symposium on Job Exposure Matrices, Southampton, Scientific Report No 2, 78-82, 1983.
14. Siemiatycki J, Gerin M, Nadon L, Goldberg M, Richardson L. L'exposition professionnelle au formaldéhyde et le risque de cancer. Submitted to the Institut de recherche en santé et sécurité du travail, 18 pp, 1983.
15. Task Force on Chemicals in the Environment and Human Reproductive Problems in New Brunswick. Second Report. Submitted to the Department of Health of New Brunswick. 249 pp, January 1984.
16. Siemiatycki J. Evaluation des estimations actuelles concernant l'exposition professionnelle aux cancérogènes chimiques. Submitted to the Commission de la santé et sécurité au travail du Québec, 87 pages. October 1984.
17. Task Force on Chemicals in the Environment and Human Reproductive Problems in New Brunswick. Final Report submitted to the Department of Health of New Brunswick. 269 pp, March 1985.
18. Siemiatycki J, Richardson L. Expanding the vision of public health: new ways to meet old objectives. Health Promotion 24(2):10-12, 1985.
19. Task Force on Health Risks of Alachlor (A.J. Nantel, J.L. Benedetti, J.P. Farand, M. Pagé, J.C. Panisset, J. Siemiatycki, C. Viau). Report submitted to the Government of Quebec, 1986.
20. Siemiatycki J. Determining which workplace exposures may be carcinogenic: report on a novel epidemiologic approach. At The Centre. Canadian Centre for Occupational Health and Safety. Vol. IX, no. 5, pp. 9-10, November 1986.
21. Gerin M, Siemiatycki J. Assessment of exposure to multiple agents in the workplace. Proceedings of the Workshop on Methodology of Assessment of Occupational Exposures in the Context of Epidemiological Detection of Cancer Risks. Eds. D. Hemon, M. Goldberg, pp. 99-108, 1989.
22. Siemiatycki J, Gerin M, Nadon L, Dewar R. Risk of cancer due to occupational exposure to formaldehyde in a wide range of occupations and industries. Final report. Submitted under contract no. 1674 to the Health Protection Branch, Health and Welfare Canada, 78 pages, May 1988.
23. Siemiatycki J. Epidemiological evidence in evaluating carcinogenicity of occupational exposures. IARC Int. Tech. Report no. 88/002, IARC, Lyon, Dec, pp. 49-59, 1988.

24. IARC Working Group. Report of an IARC Working Group to review the approaches and processes used to evaluate the carcinogenicity of mixtures and groups of chemicals. IARC Int. Tech. Report no. 88/002, IARC, Lyon, Dec. 1988.
25. Siemiatycki J, Nadon L, Dewar R, Gerin M, Armstrong B, Richardson L. Risk of cancer due to occupational exposure to polynuclear aromatic hydrocarbons in a wide range of occupations and industries: Final report. Submitted under contract no. 1984 to the Health Protection Branch, Health and Welfare Canada, 162 pages, May 1989.
26. Siemiatycki J, Lakhani R, Gerin M, Dewar R, Richardson L. Risk of cancer due to exposure to benzene, toluene, and xylene in a wide range of occupations and industries: Final report. Submitted under contract no. 2025 to the Health Protection Branch, Health and Welfare Canada, 235 pages, June 1989.
27. Siemiatycki J, Franco E, Dewar R, Desy M. Risk of cancer due to cigarette smoking - results of a multi-site case-control study. Report submitted under contract no. 2069 to the Health Protection Branch, Health and Welfare Canada, 23 pages, March 1990.
28. Siemiatycki J. Review of findings from a registry-like database designed to discover occupational carcinogens. Proceedings of the Workshop on Indicators of Environmental Health. Waterloo Institute for Risk Research and Health and Welfare Canada. 1990.
29. Camus M, Siemiatycki J. Cancer risks associated with non-occupational exposure to chrysotile asbestos. Report submitted under contract no. 064SS.H4078-1-C339. 1991.
30. Siemiatycki J. Toxic Waste Sites And Human Health: Feasibility of Epidemiologic Studies Using the Canadian Unified Toxic Waste Sites Database. Contract No. 3136. 1992.
31. *Nadon L, Siemiatycki J, Richardson L. Dépistage épidémiologique de cancérogènes en milieu de travail et son implication sur la santé environnementale. Bulletin d'Information en Santé environnementale, Volume 4, number 3, May/June 1993.
32. Gerin M, deGuire L, Siemiatycki J. Étude sur la validité des matrices emploi-exposition multisectorielles en hygiène industrielle. IRSST, Montréal, 1995.
33. Goldberg M, Farant JP, Simon P, Siemiatycki J, Armstrong B, Drouin L. A health survey of persons living near the Miron Quarry Sanitary Landfill Site. Montréal, Phase 1 (NHRDP: 502-6605-4342). July 1996.
34. Siemiatycki J, Camus M, Case BW. Non-occupational exposure to Quebec chrysotile asbestos and risk of cancer. Montréal, NHRDP Report No. 6605-3533-53. April 1996.
35. Mills CJ, Bull R, Cantor KP, Reif J, Hrudefy SE, Huston P and an Expert Working Group: Health risks of drinking water chlorination byproducts: report of an expert working group. Chronic Diseases in Canada. 1998.
36. Krewski D, Burnett R, Goldberg M, Hoover K, Siemiatycki J, et al. Reanalysis of the Harvard Six-City Study and the American Cancer Society Study of Air Pollution and Mortality: Validation and Replication. Health Effects Institute, Cambridge MA, 2000.
37. Krewski D, Burnett R, Goldberg M, Hoover K, Siemiatycki J, et al. Reanalysis of the Harvard Six-City Study and the American Cancer Society Study of Air Pollution and Mortality: Sensitivity Analyses. Health Effects Institute, Cambridge MA, 2000.
38. Payment J, Siemiatycki J, Richardson L, Renaud G, Franco E, Prevost M. An epidemiological study of gastrointestinal health effects of drinking water. American Water Works Assoc. 103 pp. 2000.
39. Raynault M-F, Dussault C, Bartlett G, Deschenes M, Fortin S, Giroux M, Godard B, Jean MS, Mes-Masson A-M, Siemiatycki J, Vachon M-H. Rapport final du groupe-conseil sur l'Encadrement des banques de données et des banques de matériel biologique à des fins de recherche en santé. Fonds de la recherche en santé du Québec (FRSQ), Montréal, Québec. 8 December 2006.
40. Raynault M-F, Dussault C, Bartlett G, Deschenes M, Fortin S, Giroux M, Godard B, Jean MS, Mes-Masson A-M, Siemiatycki J, Vachon M-H. Sommaire du rapport final du groupe-conseil sur l'Encadrement des banques de données et des banques de matériel biologique à des fins de recherche en santé. Fonds de la recherche en santé du Québec (FRSQ), Montréal, Québec. 8 December 2006.
41. Raynault M-F, Dussault C, Bartlett G, Deschenes M, Fortin S, Giroux M, Godard B, Jean MS, Mes-Masson A-M, Siemiatycki J, Vachon M-H. Reconnaître la valeur sociale de la recherche dans le respect

de la personne : Banques de données et banques de matériel biologique - Pour un nouveau cadre éthique et légal. Fonds de la recherche en santé du Québec (FRSQ), Montréal, Quebec. May 2007.

42. Siemiatycki J. Estimating the amount of environmental health research being funded by national funding agencies in Canada. Report submitted under contract no. 4500156045 to Health Canada (Environmental and Occupational Toxicology & Environmental Health Sciences Bureau), 40 pages. August 2007.

BOOK

1. Siemiatycki J. Risk Factors for Cancer in the Workplace. CRC Press, Boca Raton, 1991, 310 pp.
Chap 1. Siemiatycki J. Epidemiologic approaches to discovering occupational carcinogens
Chap 2. Siemiatycki J, Richardson L. Case-control design and fieldwork methods.
Chap 3. Siemiatycki J. Nadon L, Lakhani R, Begin D, Gerin M. Exposure assessment.
Chap 4. Siemiatycki J. Statistical methods.
Chap 5. Siemiatycki J, Gérin M, Dewar R, Nadon L, Lakhani R, Begin D, Richardson L. Associations between occupational circumstances and cancer
Chap 6. Siemiatycki J. Interpretation of findings.

ARTISTIC WORKS

1. Siemiatycki J, Slodovnick A. The Hockey Card. Illustrated by Doris Barrette. Lobster Press, Montréal, 2002, 32 pp.
2. Siemiatycki J, Slodovnick A. La carte de hockey. Illustrated by Doris Barrette. Translated by Christiane Duchesne. Lobster Press, Montréal, 2002, 32 pp.
3. Siemiatycki J, Slodovnick A. The Baseball Card. Illustrated by Laura Watson. Lobster Press, Montréal, 2005, 32 pp.
4. Siemiatycki J, Slodovnick A. La Estampa de béisbol. Illustrated by Laura Watson. Translated. Lobster Press, Montréal, 2005, 32 pp.

SCIENTIFIC PRESENTATIONS - INVITED

1. Siemiatycki J. Monitoring the occupational environment for carcinogens: a pilot study in Montréal. Working Environment and Health Seminar, McGill University, Department of Epidemiology, September 1978.
2. Siemiatycki J, Richardson L. Le défi prioritaire en santé communautaire: la protection et l'amélioration de l'environnement. Association pour la santé publique du Québec, Montréal, Quebec, October 1979.
3. Siemiatycki J. Occupational carcinogenesis. Séminaire départemental, Direction générale de la protection de la santé, Santé et Bien-être Social Canada, Ottawa, January 1981.
4. Siemiatycki J. An overview of problems in identifying occupational carcinogens. Canadian Labour Congress Meeting on Occupational Cancer, Montréal, February 1981.
5. Siemiatycki J. Feasibility of an exposure-based case-control approach to discovering occupational carcinogens: preliminary findings. Cold Springs Harbor Conference on Quantification of Occupational Cancer, Cold Springs Harbor, New York, March 1981.
6. Siemiatycki J. Dépistage des facteurs cancérigènes dans les milieux professionnels montréalais. Séminaire départemental, Département de médecine du travail et d'hygiène du milieu, Université de Montréal, Montréal, Quebec, March 1981.
7. Siemiatycki J. Surveillance program for occupationally related cancer. Société de Toxicologie du Canada, Montréal, Quebec, December 1981.
8. Gérin, J, Siemiatycki J. Translating job histories into histories of occupational exposure in an interview-based case-control Study. Medical Research Council Symposium on Job-Exposure Matrices, Southampton, England, April 1982.
9. Siemiatycki J. Rapporteur's report. Medical Research Council Symposium on Job-Exposure Matrices, Southampton, England, April 1982.
10. Siemiatycki J. Mortality in the general population in Quebec's asbestos mining areas. World Symposium on Asbestos, Montréal, May 1982.

11. Siemiatycki J. Occupational cancer epidemiology. McGill Department of Epidemiology seminar series, Montréal, Quebec, October 1982.
12. Siemiatycki J. Rapport d'une étude pilote qui vise à découvrir des agents cancérigènes de l'environnement professionnel. Institut Armand-Frappier, Laval, Quebec, October 1982.
13. Siemiatycki J, Richardson L, Gérin M. Discovering occupational carcinogens by an exposure-based case-control approach: feasibility and pilot study results. American Public Health Association Meeting, Montréal, Quebec, November 1982.
14. Siemiatycki J. Discovering occupational carcinogens by means of a novel exposure-based case-control approach. U.S. National Institute of Occupational Safety and Health seminar series. Cincinnati. November 1982.
15. Siemiatycki J. Dépistage des facteurs cancérigènes dans le milieu professionnel montréalais - rapport d'une étude pilote. Conférence-midi de l'Institut de recherche en santé et sécurité au travail, Montréal, Quebec, December 1982.
16. Siemiatycki J. Rapport d'une étude qui vise à découvrir des agents cancérigènes dans l'environnement professionnel. Conférence départementale, Université de Sherbrooke, Sherbrooke, Quebec, February 1983.
17. Siemiatycki J. Contribution of epidemiology to discovery of occupational carcinogens: case-control study in the Montréal area. Seminar Series, Lady Davis Institute, Jewish General Hospital, Montréal, March 1983.
18. Siemiatycki J. Hospital-based studies of environmental causes of cancer. Seminar series, McGill Cancer Centre and Montréal General Hospital, March 1983.
19. Siemiatycki J. Analyse préliminaire d'une enquête cas-témoins sur les expositions professionnelles et le cancer, INRS-Santé, Paris, France, April 1983.
20. Siemiatycki J. Découvrir les cancérigènes professionnels par des méthodes épidémiologiques. Congrès de l'ACFAS, Trois-Rivières, Quebec, May 1983.
21. Siemiatycki J. Surveillance of occupational cancer. University of Ottawa Special Course in Environmental Epidemiology, Ottawa, October 1983.
22. Gérin M, Richardson L, Siemiatycki J. Obtaining job exposure histories based on interview and expert assessment. Job Exposure Assessment Meeting. International Agency for Research on Cancer, Lyon, France, February 1984.
23. Siemiatycki J. Associations between bladder cancer and coffee and cigarette consumption: preliminary results of a case-control study. Environmental Risk Factors in Bladder Cancer Symposium, Lyon, February 1984.
24. Siemiatycki J. Preliminary results of an occupational cancer monitoring program. Kellogg Center Seminar Series. Montréal General Hospital, April 1984.
25. Siemiatycki J. Nickel, chromium and cancer: preliminary results from a case-control study. School of Occupational Health. McGill University, Montréal, April 1984.
26. Siemiatycki J. Les premiers résultats d'une stratégie épidémiologique visant à découvrir des produits cancérigènes dans l'environnement industriel. Micro-hebdo, Institut Armand-Frappier, May 1984.
27. Siemiatycki J. Cancer mortality in a general population highly exposed to asbestos. CAN-AM Chemical Congress. Montréal, June 1984.
28. Siemiatycki J. Some occupational and non-occupational risk factors for cancer: results from a multi-site case-control study in Montréal. Special seminar. Health Protection Branch of Health and Welfare Canada, January 1985.
29. Siemiatycki J. Premiers résultats d'un système de surveillance en épidémiologie visant à découvrir des agents cancérigènes dans le milieu industriel. Micro-Hebdo-Actualités, Institut Armand-Frappier, Laval, February 1985.
30. Siemiatycki J. Discovering environmental carcinogens. Elizabeth Stern Memorial Lecture. U.C.L.A. School of Public Health, Los Angeles, California, May 1985.
31. Siemiatycki J. Cancer surveillance. International Conference on Environmental and Occupational Significance of Industrial Carcinogens, Bologna, Italy, October 1985.

32. Siemiatycki J. Overview of an epidemiologic case-control approach to discovering occupational carcinogens. Special seminar. Health Department of Torino and Epidemiology Department of University of Torino, Torino, Italy, October 1985.
33. Siemiatycki J. Epidemiology of juvenile-onset diabetes in Montréal. Special lecture to Association of endocrinologists of Rhone-Alpes Region of France, Lyon, October 1985.
34. Siemiatycki J. Cancer risks associated with exposure to organic dusts. Special seminar. International Agency for Research on Cancer, Lyon, October 1985.
35. Siemiatycki J. Organic dusts and cancer. School of Occupational Health Seminar Series, McGill University, December 1985.
36. Gérin, M, Siemiatycki J, Richardson L, Begin, D, Kemper, H, Lakhani, R, Nadon L. Associations entre cancer et exposition professionnelle à diverses substances. Résultats d'une étude épidémiologique à Montréal. Association pour l'hygiène industrielle au Québec, VIII Congrès, City of Québec, Quebec, May 1986.
37. Siemiatycki J. Synthèse des résultats d'un système de surveillance épidémiologique des expositions professionnelles cancérigènes, Université Laval, May 1986.
38. Siemiatycki J. L'analyse des données appliquée à la santé et à la sécurité du travail. Symposium sur l'analyse de données, IRSST, Montréal, October 1986.
39. Siemiatycki J. An overview of epidemiologic contributions to the discovery of occupational carcinogens. Society of Toxicology of Canada, Montréal. December 1986.
40. Siemiatycki J, Wacholder, S, Dewar R, Begin, D, Richardson L, Rosenman, K, Gerin M. Smoking and degree of occupational exposure: are internal analyses likely to be confounded by smoking status? Symposium on Smoking in Occupational Cancer Studies. National Cancer Institute, Washington, December 1986.
41. Siemiatycki J. Petroleum-derived liquids and cancer risk: findings from a case-control study. McGill University, Department of Epidemiology, April 1987.
42. Siemiatycki J. Methods and findings from a case-control study of insulin-dependent diabetes mellitus in Montréal. Montréal Children's Hospital, May 1987.
43. Colle, E, Siemiatycki J. Epidemiologic and immunologic evidence concerning the etiology of insulin-dependent diabetes. Institut Armand-Frappier, May 1987.
44. Siemiatycki J. The role of epidemiology in environmental impact assessment. Symposium on Health in Environmental Impact Assessment. Canadian Public Health Association and Environment Canada, Ottawa, May 1987.
45. Siemiatycki J. Methods and results of a monitoring system for occupational carcinogens. Johns Hopkins University School of Public Health Seminar, Baltimore, Maryland, October 1987.
46. Siemiatycki J. Cancer risks associated with petroleum-derived liquids and combustion products. National Cancer Institute, Occupational Studies Section, Bethesda, Maryland, October 1987.
47. Gerin M, Siemiatycki J. Assessment of exposure to multiple agents in the workplace - experience from a population-based case-control study in Montréal. Workshop of European Economic Community on Methods of Assessment of Occupational Exposures for Epidemiologic Detection of Cancer Risks, Paris, February 1988.
48. Siemiatycki J. Overview of epidemiologic tasks. International Joint Commission Workshop on the Role of Epidemiology in Assessing the Effects of Great Lakes Water Quality on Human Health. Toronto, March 1988.
49. Siemiatycki J. Results of an exposure-based case-control study of occupational carcinogens. Ontario Cancer Treatment and Research Foundation, Toronto, April 1988.
50. Siemiatycki J. Methodology of cancer case-control studies. Special Lecture Series in McGill Summer Program in Epidemiology, Montréal, May 1988.
51. Siemiatycki J. Costs and benefits of various approaches to estimating occupational cancer risks in case-control studies. Symposium on Occupational Cancer Epidemiology. Vancouver, June 1988.
52. Richardson L.R, Siemiatycki J, Dewar R. How well does a job exposure matrix reflect the exposure assessment of individually coded job histories? Workshop on job exposure matrices held at INSERM, Paris, October 1988.

53. Siemiatycki J. Methodologic issues in an exposure-based case-control study for discovering occupational carcinogens. Medical Research Council, Biostatistics Unit, Cambridge, England, December 1988.
54. Siemiatycki J. A synthesis of findings from an occupational cancer case-control study. Invited seminar in Department of Epidemiology, School of Public Health, University of North Carolina. Chapel Hill, North Carolina, April 1989.
55. Siemiatycki J. Methodologic problems in assessing exposure status for case-control studies. National Cancer Institute Seminar, Silver Spring, Maryland. April 1989.
56. Siemiatycki J. Environmental causes of cancer. McGill Cancer Center Public Lecture Series, Montréal. May 1989.
57. Siemiatycki J. Approches épidémiologiques dans l'investigation des facteurs cancérigènes. Summer course in community health, Université Laval, City of Québec, Quebec, June 1989.
58. Krewski, D, Siemiatycki J, Nadon L, Dewar R, Gerin M. Cancer risks due to occupational exposure to PAH's. International Conference on Genetic Toxicology of Complex Mixtures, Washington, District of Columbia, September 1989.
59. Siemiatycki J. Discovering environmental carcinogens by means of a case-control methodology. Dalhousie University, Faculty of Medicine seminar, December 1989.
60. Siemiatycki J. Using epidemiologic evidence in compensation of industrial disease. Special workshop of Industrial Disease Standards Panel of Ontario, Toronto, December 1989.
61. Siemiatycki J. Epidemiologic approaches to evaluating the carcinogenicity of complex mixtures. Workshop on carcinogenicity of Complex Mixtures. National Academy of Sciences of the U.S.A., Tucson, January 1990.
62. Siemiatycki J. Review of findings from a registry-like database designed to discover occupational carcinogens. Workshop on Indicators of Environmental Health. Waterloo Institute for Risk Research and Health and Welfare Canada, Ottawa, March 1990.
63. Siemiatycki J. Findings from an occupational cancer case-control study. Invited seminar in Department of Clinical Epidemiology, Royal Victoria Hospital. Montréal, March 1990.
64. Siemiatycki J. Effect of exposure strategies on risk estimates and statistical power. International Workshop on Retrospective Exposure Assessment for Occupational Epidemiologic Studies, Leesburg, Virginia, March 1990.
65. Siemiatycki J. Discovering environmental carcinogens: an epidemiologic perspective. Invited seminar in Department of Epidemiology, School of Public Health, University of North Carolina. Chapel Hill, North Carolina, March 1990.
66. Siemiatycki J. Discovering environmental carcinogens: review of an epidemiologic surveillance project. Invited seminar in Occupational & Environmental Health Unit, University of Toronto, Toronto, April 1990.
67. Siemiatycki J. Environnement et cancer: une perspective épidémiologique. 58th Association canadienne française pour l'avancement des sciences. Colloque santé et environnement, City of Québec, Quebec, April 1990.
68. Payment P, Richardson L, Edwards M, Franco E, Siemiatycki J. Drinking water related illness: an epidemiological study. Second International Biennial Water Quality Symposium: Microbiological Aspects, Vina Del Mar, Chile, August 1990.
69. Siemiatycki J. Occupational cancer. Seminar series of Laboratory Centre for Disease Control, Health and Welfare Canada, Ottawa, March 1991.
70. Siemiatycki J. A decade of searching for occupational carcinogens: methods and results of a case-control study. Seminar series of the Division of Clinical Epidemiology, Montréal General Hospital, Montréal, March 1991.
71. Siemiatycki J. Detecting occupational carcinogens using epidemiologic methods: results and their interpretation. McGill University, Department of Epidemiology and Biostatistics, Summer Lecture Series, Montréal, June 1991.
72. Siemiatycki J. Overview of results of an occupational cancer monitoring study. School of Public Health, University of California at Berkeley, Berkeley, October 1991.

73. Siemiatycki J. Discussant of paper on Mortality of oil refinery and distribution workers. International Symposium on the Health Effects of Gasoline, Miami, November 1991.
74. Begin, D, Gerin M, De Guire L, Siemiatycki J, Adib G, Fournier C. Étude sur la validité des matrices emploi-exposition multisectorielles en hygiène industrielle. Scientific Committee on Computing in Occupational and Environmental Health, III International Workshop, Paris, November 1991.
75. Siemiatycki J. Cancer et travail : connaissances actuelles, approches antérieures et nouvelles. Colloque de l'Association des médecins du travail du Québec, Montréal. June 1992.
76. Siemiatycki J. Risques de cancers reliés aux expositions chimiques en milieu de travail: résultats d'une étude épidémiologique à Montréal. IRSST, Montréal, November 1992.
77. Siemiatycki J. Carcinogens in the occupational environment. Invited seminar in School of Public Health, University of North Carolina, Chapel Hill, North Carolina. December 1992.
78. Siemiatycki J. Discussant of invited seminar on risk assessment. School of Occupation Health, McGill University, March 1993.
79. Siemiatycki J. Are the effects of smoking on lung and bladder cancer confounded by occupational carcinogens? Invited seminar given at the Michigan Cancer Foundation, Detroit and at the University of Michigan, Ann Arbor, May 1993.
80. Siemiatycki J. Are the apparent effects of cigarette smoking on lung and bladder cancers due to uncontrolled confounding by occupational exposures? McGill University, Department of Epidemiology and Biostatistics, Montréal, December, 1993.
81. Siemiatycki J. Occupational causes of cancer. President's Cancer Panel Meeting on Avoidable Causes of Cancer, Bethesda, April 1994.
82. Siemiatycki J. Retrospective exposure assessment in community-based studies. Conference on Retrospective assessment of occupational exposures in epidemiology, IARC, Lyon, April 1994.
83. Siemiatycki J. Are the apparent effects of cigarette smoking on lung and bladder cancers due to uncontrolled confounding by occupational exposures? Department of Human Oncology, University of Torino, Torino, Italy, April 1994.
84. Siemiatycki J. Risque de cancer dû au tabagisme. Département de médecine sociale et préventive, Université Laval, Québec, May 1994.
85. Siemiatycki J. Registry studies of bladder cancer. NCI Workshop on Occupational Exposures and Urogenital Cancers, Rockville, May 1994.
86. Siemiatycki J. Facteurs de risques environnementaux pour le cancer: une perspective épidémiologique. Atelier sur la recherche en cancer, Université du Québec à Rimouski, April 1995.
87. Camus M, Siemiatycki J. Non-occupational exposure to asbestos: how to assess dose and risk. McGill University, Department of Epidemiology and Biostatistics. Montréal, May 1995.
88. Siemiatycki J. Occupational carcinogens in Montréal. Seminar - International Agency for Research on Cancer, Lyon, France, June 1995.
89. Siemiatycki J. Occupational causes of cancer: findings from a large scale case-control study of occupational cancer. Department of Medical Informatics, Biometry and Epidemiology, University of Essen, Essen, Germany, July 1995.
90. Siemiatycki J. Assessing occupational exposures in community based epidemiological studies. Bremen Institute for Preventive and Social Medicine, Bremen, Germany, July 1995.
91. Case, B, Camus M, Richardson L, Siemiatycki J. Ascertainment of mesothelioma among Québec women from 1970 to 1990. Special Symposium on Mesothelioma, IRSST, Montréal, August 1995.
92. Siemiatycki, J. Une nouvelle approche épidémiologique pour le dépistage de cancérrogènes en milieu de travail. Club de recherches cliniques du Québec, Bromont, Quebec, September 1995.
93. Siemiatycki J. Occupational causes of cancer: findings from a large scale case-control study of occupational cancer. Special seminar. School of Public Health, Univ. of Michigan, Ann Arbor, Michigan, June 1996.
94. Siemiatycki J. An empirical evaluation of the magnitude of confounding bias. Statistical Society of Canada, Waterloo, June 1996.

95. Siemiatycki J. Occupational exposures and cancer risk: recent results and methodological insights from a population-based case-control study in Montréal. Department of Epidemiology & Biostatistics, McGill University. October, 1996.
96. Siemiatycki J. Utilités et limites des études épidémiologiques dans l'évaluation des risques environnementaux. ACFAS, City of Québec, Quebec, May 1998.
97. Siemiatycki J. International collaboration in cancer epidemiology. Society for Epidemiology Research, Chicago, June 1998.
98. Siemiatycki J. Accuracy of the EPA risk assessment model for predicting the risk of lung cancer at environmental levels of asbestos exposure. National Cancer Institute, Rockville, Maryland, March 1999.
99. Siemiatycki J. Risk of lung cancer at environmental levels of asbestos exposure. University of Toronto, Toronto, September 1999.
100. Siemiatycki J. Estimating risks due to low level exposures. Society for Epidemiology Research, Seattle, June 2000.
101. Siemiatycki J. Debater on the proposition that research is a top priority in occupational cancer prevention. Preventive Oncology Seminar, Cancer Care Ontario, Toronto, April 2001.
102. Rachet B, Siemiatycki J, Abrahamowicz M, Leffondre K. Various aspects of smoking behavior on lung cancer risk: a flexible modeling approach. National Cancer Institute, Bethesda, May 2001.
103. Siemiatycki J. Challenges to epidemiology and challenges to Canadian epidemiologists. National Student Conference of Epidemiology, Toronto, June, 2001.
104. Siemiatycki J. President's address. Congress of Epidemiology, Toronto, June, 2001.
105. Siemiatycki J. Découvrir les cancérigènes dans l'environnement: bilan des activités de recherche passées et perspectives d'avenir. Département de médecine sociale et préventive, Université de Montréal, October 2001.
106. Siemiatycki J. Risque de cancer chez les femmes résidentes des villes des mines d'amianté québécoises: Évaluation du risque attribuable à des « faibles » niveaux d'expositions et validation de la méthode d'évaluation de risque (« risk assessment ») du E.P.A. Département de santé environnementale, Université de Montréal, October 2001.
107. Rachet B, Siemiatycki J, Leffondre K, Abrahamowicz M. Relations dose-réponse entre la fumée de cigarette et le cancer pulmonaire à partir d'une étude cas-témoins à Montréal : Estimations utilisant une modélisation flexible. Congrès INRS-Institut Armand-Frappier, Sainte-Adèle, Quebec, November 2001.
108. Siemiatycki J, Camus M, Case B, Desy M, Parent, M.-É. Risque de cancer chez les résidentes des villes de l'amianté au Québec: Évaluation du risque attribuable à des « faibles » niveaux d'expositions et validation de la méthode d'évaluation de risque de l'E.P.A. Symposium sur l'amianté of Institut national de santé publique du Québec, Montréal, December 2001.
109. Laplante O, Parent M.-É, Siemiatycki J. Risque de mésothéliome et de cancer du poumon associé à l'exposition professionnelle aux fibres d'amianté, Montréal 1979-85. Symposium de l'Institut national de santé publique du Québec, Montréal, December 2001.
110. Siemiatycki J. Occupational causes of cancer: overview of the contribution of a study in Montréal, Research Day at Dept of Epidemiology and Community Medicine, University of Ottawa, April 2002.
111. Siemiatycki J. Biostatistical problems in epidemiologic case-control studies. Statistical Society of Canada, Hamilton, Ontario, May 2002.
112. Leffondre K, Abrahamowicz M, Siemiatycki J. Definition of risk sets for Cox's analysis of case-control data with time-varying exposures: A simulation study. Intended Society for Clinical Biostatistics (ISCB), Dijon, France, September 2002.
113. Siemiatycki J. Occupational causes of cancer. CCERN and Health Canada Research Workshop, Montebello, Quebec. October 2002.
114. Siemiatycki J. Occupational causes of cancer. Departmental seminar, McGill University, Montréal. November 2002.
115. Siemiatycki J. Facteurs environnementaux dans l'étiologie du cancer. Retraite annuelle du centre de recherche du CHUM, St-Sauveur, Quebec. November 2002.
116. Siemiatycki J. Environmental and occupational causes of cancer. Seminar. Cancer Care Ontario, Toronto, February 2003.

117. Siemiatycki J. The state of epidemiology in Canada. Plenary address. CSEB Student Congress, Halifax, Nova Scotia, June 2003.
118. Siemiatycki J. Occupational cancer epidemiology: the evolving big picture. Distinguished Scientist Lecture, Division of Cancer Epidemiology and Genetics, National Cancer Institute, Rockville MD, October 2003.
119. Siemiatycki J. Challenges in cancer epidemiology. Meeting of the Institute Advisory Board of Institute for Cancer Research, CIHR, Montréal, June 2004.
120. Siemiatycki J. Keynote address. Occupation and cancer. International Association of Cancer Registries, Beijing, September 2004.
121. Siemiatycki J. Which cancers are most important, what are the associated occupational situations and which confounders are involved? Burden of Cancer Epidemiologic Workshops, Health and Safety Executive. Manchester, UK, November 2004.
122. Siemiatycki J. Occupational causes of cancer. New Strategies for Recognizing and Preventing Occupational Disease, Canadian Center for Occupational Health and Safety, Toronto, March 2005.
123. Siemiatycki J. Occupational causes of cancer. The Respiratory Epidemiology & Clinical Research Unit, Montréal Chest Institute, Montréal, March 2005.
124. Siemiatycki J. Environnement et cancer : quels sont les risques? Les Belles Soirées public lecture series, Université de Montréal, Montréal, April 2005.
125. Siemiatycki J. An overview of environmental, occupational & lifestyle causes of lung cancer. Cancer Axis, McGill University Hospital Centre Research Institute, Montréal, June 2005.
126. Siemiatycki J. Les règles des comités d'éthique vont amputer notre capacité de prévenir des maladies et sauver des vies. Réunion de FRSQ sur les banques de données et des matières biologiques, Montréal, June 2005.
127. Siemiatycki J. Introductory comments. Joint Meeting of the Canadian Society for Epidemiology and Biostatistics and the Society for Epidemiologic Research, Toronto, June 2005.
128. Siemiatycki J. The burden of occupational cancer on workers and on society. Joint Meeting of the Canadian Society for Epidemiology and Biostatistics and the Society for Epidemiologic Research, Toronto, June 2005.
129. Siemiatycki J. Revue des expositions professionnelles associées au cancer (Review of occupational exposures associated with cancer): pre-conference training session. Environnement et santé. Congrès international de l'Association des Épidémiologistes de Langue Française (ADELF), City of Québec, Quebec, September 2005.
130. Siemiatycki J. Opening session. Environnement et santé. Congrès international de l'Association des Épidémiologistes de Langue Française (ADELF), City of Québec, Quebec, September 2005.
131. Siemiatycki J. Impact de l'environnement et du milieu de travail sur le cancer : connaissances récentes. 9es Journées annuelles de santé publique (JASP), City of Québec, Quebec, November 2005.
132. Siemiatycki J. La recherche épidémiologique sur le cancer. Canadian Cancer Society - 2005 Annual Conference, City of Québec, Quebec, November 2005.
133. Siemiatycki J. Occupational EMF exposure and risk of cancer – methodological considerations. Workshop on the Future Needs of Electro-magnetic Fields Occupational Studies in the Electric Utility Industry, Edinburgh, September 2006.
134. Siemiatycki J. What is known about the modifiable causes of cancer and why we will not learn much more: Reflections on the decline of epidemiology as a tool to elucidate disease etiology. Department of Epidemiology, Biostatistics & Occupational Health, McGill University, Montréal, October 2006.
135. Siemiatycki J. Keynote Speaker. Environmental causes of cancer. 28th Annual Meeting of the International Association of Cancer Registries, Goiania, Brazil, November 2006.
136. Parent M.-E, Rousseau M.-C, Siemiatycki J, Boffetta P, Cohen A. Using the workplace as a window to study the role of diesel and gasoline engine emissions in lung cancer development. Invited abstract submitted to the Eleventh International Congress of Toxicology, Montréal, Quebec, July 2007.
137. Siemiatycki J. Keynote Speaker. The future of occupational epidemiology? 19th International Conference on Epidemiology in Occupational Health (EPICOH 2007), Banff, October 2007. *Occup. Environ. Med.* 2007 Dec; 64:46.

138. Siemiatycki J. Relationship between environmental risks and health of seniors. Workshop on Seniors' Health and the environment. Health Canada, Ottawa, February 2008.
139. Siemiatycki J. Freedom of research - is it threatening or threatened? Conference of Institutional Review Boards of Quebec, (4e Journées d'étude des CER), City of Québec, Quebec, October 2008.
140. Siemiatycki J. Cancer and Environment – Annual University of Montréal Medical Faculty Assembly, Montréal, December 2008.
141. Siemiatycki J. Impact de l'environnement et du milieu de travail sur les risques de cancer : méthodologie de recherche et résultats. Conférence en santé publique, Université Laval, May 2009.
142. Siemiatycki J. CIHR and Epidemiologic Research. CSEB, Ottawa, May 2009.
143. Siemiatycki J. Mode de vie, milieu de vie: les causes modifiables du cancer. (Lifestyles and environment: modifiable causes of cancer). Keynote address. Conference nationale pour vaincre le cancer, Montréal April 2010.
144. Siemiatycki J. Montréal case-control studies on occupation and cancer. Presentation for II International Course on occupational cancer. Instituto Nacional de Cancerologia, Bogota, Colombia, August 2010.
145. Siemiatycki J. Modifiable causes of cancer and estimates of attributable fractions. Presentation for II International Course on occupational cancer, Instituto Nacional de Cancerologia, Bogota, Colombia, August 2010.
146. Siemiatycki J. Asbestos and cancer in Quebec: a presentation of studies in three populations. Presentation for II International Course on occupational cancer. Instituto Nacional de Cancerologia, Bogota, Colombia, August 2010.
147. Siemiatycki J. An overview of recognized environmental and lifestyle causes of cancer, and their contribution to the overall burden of cancer. International Congress of Pathophysiology, Montréal, September 2010.
148. Siemiatycki J. Les causes modifiables du cancer (Lifestyles and environment: modifiable causes of cancer). Conference annuelle de la Société du cancer du Canada, division Québec, November 2010.
149. Siemiatycki J. Alison McDonald's research on the impact of Medicare in Québec. Department of Epidemiology and Biostatistics, McGill University, Montréal, Quebec, May 2011.
150. Siemiatycki J. An overview of environmental causes of cancer. Special Symposium to honour Nobel Prize winner CRCHUM, Montréal, Quebec, June 2011.
151. Siemiatycki J. Review of IARC evaluation on cellphones and cancer. Congress of Epidemiology, Montréal, Quebec, June 2011.
152. Siemiatycki J. L'évidence concernant les risques de cancer liés à l'utilisation du téléphone cellulaire. Institut national de santé publique du Québec, October 2011.
153. Siemiatycki J. Do cellphones cause brain cancer? Canadian Cancer Research Conference, Toronto, November 2011.
154. Siemiatycki J. Do cellphones cause brain cancer? Canadian Center for Architecture. Public science lecture series, Montréal, Quebec, January 2012.
155. Siemiatycki J. Do cellphones cause brain cancer? McGill University Department of Epidemiology lecture series, Montréal, Quebec, March 2012.
156. Siemiatycki J. L'environnement et le risque de cancer. Table ronde. Conference annuelle de la Coalition Cancer, Montréal, Quebec, March 2012.
157. Siemiatycki J. An Overview of Modifiable Risk Factors for Cancer. CHUM Department of Medicine, Montréal, Quebec, March 2012.
158. Siemiatycki J. Do cell phones cause brain cancer? The epidemiologic evidence. Grand Rounds, St-Mary's Hospital, Montréal, Quebec, September 2012.
159. Siemiatycki J. The epidemiology of cell phones and brain cancer. Centre hospitalier universitaire Vaudois, Lausanne, Suisse, October 2012
160. Siemiatycki J. Occupational causes of cancer. Annual meeting of Occupational & Environmental Medical Association of Canada, Montréal, Quebec, September 2013.
161. Siemiatycki J. Fraction of lung cancer that is legally attributable to smoking: a novel parameter. ISPED, Bordeaux, France, November 2013.

162. Siemiatycki J. Some challenges in environmental cancer research. Boston University School of Public Health, Boston, Massachusetts, February 2014.
163. Siemiatycki J. Les causes modifiables du cancer: le cancer peut être évité. Symposium de La Fondation Sauve Ta Peau, Montréal, Quebec, September 2014.
164. Siemiatycki J. Using epidemiologic research to combat the tobacco industry. BIPS, Bremen, Germany, September 2015.
165. Siemiatycki J. Insights into the use of epidemiologic data in a class action lawsuit against the tobacco industry. CRCHUM division seminar, Montréal, Quebec, September 2015.
166. Siemiatycki J. Development of a methodology to estimate legally attributable fraction of lung cancer attributable to cigarette smoking. McGill Univ Dept of Epidemiology, Montréal, Quebec, October 2015.
167. Siemiatycki J. Using epidemiologic research to combat the tobacco industry. SIRIC-BRIO Cancer Centre. Bordeaux, France, November 2015.
168. Siemiatycki J. Do cell phones cause brain cancer? The epidemiologic evidence. Dept of Medicine, CHUM, Montréal, Québec, November 2015.
169. Siemiatycki J. Occupation and cancer. Conference for the 50th Anniversary of IARC, Lyon, June 2016.
170. Siemiatycki J. Contribution of epidemiology to knowledge on occupational risk factors for cancer. 34^e Congrès national de Médecine et Santé au Travail, Paris, France, June 2016.
171. Siemiatycki J. The influence of JC McDonald on the evolution of epidemiology in Canada. Symposium in honour of JC McDonald. McGill Univ., Montréal, Quebec, May 2017.
172. Siemiatycki J. A survey of knowledge on occupational causes of cancer. Keynote address. International Association of Cancer Registries, Utrecht, Netherlands, October 2017.
173. Siemiatycki J. La preuve statistique au tribunal : recours collectif en situation d'incertitude. Café-statistique de la Société des statisticiens français de la région parisienne, Paris, France, May 2018.

SCIENTIFIC PRESENTATIONS - OFFERED AND ACCEPTED

1. Siemiatycki J. Comparison of mail, telephone and home interview methods for health surveys. International Epidemiologic Association Meeting. Puerto Rico. August 1977.
2. Siemiatycki J, Day NE, Fabry J, Cooper, JA. Identification d'agents cancérigènes dans le milieu de travail: un nouveau système épidémiologique de monitoring. Deuxième conférence internationale sur la science des systèmes dans le domaine de la santé. Montréal, July 1980.
3. Siemiatycki J, Richardson L, Pless B. Equality in Medical Care under National Health Insurance in Montréal. Deuxième conférence internationale sur la science des systèmes dans le domaine de la santé. Montréal, July 1980.
4. Siemiatycki J. Discovering occupational carcinogens. International Symposium on Chemical Mutagenesis, Human Population Monitoring and Genetic Risk Assessment. Ottawa. October 1980.
5. Siemiatycki J, Richardson L, Gerin M. Discovering occupational carcinogens by a substance-based case-control approach-fieldwork considerations. International Epidemiologic Association Meeting. Edinburgh. August 1981.
6. Siemiatycki J, Colle E, West R, Belmonte M. Space-time clustering of juvenile-onset diabetes in Montréal. International Epidemiologic Association Meeting. Edinburgh. August 1981.
7. Siemiatycki J, Gerin M, Richardson L. Discovering occupational carcinogens by an exposure-based case-control approach: exposure assessment aspects. Second International Symposium on Epidemiology in Occupational Health. Montréal, August 1982.
8. Siemiatycki J, Gerin M, Lakhani R, Dewar R, Pellerin J, Richardson L. Nickel and cancer associations from a multicancer occupation exposure case-referent study. Symposium on Nickel in the Environment. Lyon, March 1983.
9. Gerin M, Siemiatycki J. La traduction des histoires professionnelles en histoires d'expositions chimiques: un défi pour l'hygiéniste du travail. Congrès de l'Association pour l'hygiène industrielle du Québec. Quebec, May 1983.
10. Siemiatycki J, Colle E, Campbell S, Belmonte M. Preliminary analysis of a case-control study of Type I diabetes mellitus. Baltimore, June 1985.

11. Siemiatycki J, Richardson L, Gerin M, Goldberg M, Dewar R. Associations between nine sites of cancer and nine organic dusts: results from a hypothesis-generating case-control study in Montréal. Society for Epidemiologic Research. Chapel Hill, North Carolina, June 1985.
12. Richardson L, Siemiatycki J, Gerin M, Goldberg M, Dewar R, Desy M, Campbell S, Wacholder S. Associations between several sites of cancer and nine organic dusts: results from a case-control study. Fourth International Symposium on Epidemiology in Occupational Health. Como, Italy, September 1985.
13. Richardson L, Siemiatycki J. Case-control study methods: when to interview subjects and non-response bias. Fourth International Symposium on Epidemiology in Occupational Health. Como, Italy, September 1985.
14. Soskolne C, Jhangri G, Checkoway, Risch H, Siemiatycki J, et al. Sulphuric acid exposure in laryngeal cancer: induction and latency estimates from a lagged exposure window analysis. XII Scientific Meeting of the International Epidemiology Assoc. Los Angeles, August, 1990.
15. Payment P, Richardson L, Edwardes M, Franco E, Siemiatycki J. (1989). Gastrointestinal illness and drinking water: a prospective epidemiological study. 57th Conjoint Meeting on Infectious Diseases (CACMID), Montréal, 25-29 November 1989, Résumé C-30.
16. Payment P, Richardson L, Edwardes M, Franco E, Siemiatycki J. (1990). Drinking water related gastrointestinal illnesses. 1990 Annual Meeting of the American Society for Microbiology, Anaheim California, 13-17 May 1990.
17. Payment P, Richardson L, Edwardes M, Franco E, Siemiatycki J. (1990). A prospective epidemiological study of drinking water related gastrointestinal illnesses. International Association on water Pollution Research and Control, Health Related Water Microbiology Group, Tubingen, West Germany, 1-6 April 1990.
18. Case BA, Dufresne A, Siemiatycki J, Fraser R. Decoding occupational history from total lung particulate analysis. II: A comparative study. Brit. Occ. Hyg. Soc.; Seventh International Symposium on Inhaled Particles, Edinburgh, September 1991, S4.5.
19. Suarez-Almazor M, Soskolne C, Fung K, Jhangri G, Burch D, Howe G, Miller A, Siemiatycki J, Lakhani R, Dewar R. Choice of summary worklife exposure measures in the estimation of risk: an empirical assessment. Canadian Epidemiology Symposium. Edmonton. May. 1991.
20. Siemiatycki J, Nadon L, Dewar R. Cancer risks due to occupational exposure to polycyclic aromatic hydrocarbons. 8th International Symposium on Epidemiology in Occupational Health, Paris, France, September 1991.
21. Bourbonnais R, Siemiatycki J. Socioeconomic variables and cancer risk. Canadian Society for Epidemiology and Biostatistics. Edmonton, May 1991.
22. Gerin M, Begin D, Siemiatycki J, Dewar R. Study on the validity of the NOES job-exposure matrix using industrial hygiene measurements obtained in Montréal. Conference on Retrospective Assessment of Occupational Exposure. IARC Lyon. April 1994.
23. *Camus M, Siemiatycki J. Estimating past asbestos fiber levels in the general population of asbestos mining towns in Quebec. International Society Environmental Epidemiology, Research Triangle Park, N.C. Sept. 1994.
24. Goldberg MS, Dewar R, Siemiatycki J. Confounding and other design issues in cancer incidence studies of hazardous waste sites. Canadian Society for Epidemiology and Biostatistics. St-John's, Newfoundland, Aug 1995.
25. Goldberg MS, Dewar R, Siemiatycki J. Confounding and other design issues in cancer incidence studies of hazardous waste sites. International Society for Environmental Epidemiology. Noordwijkerhout, Netherlands, Aug, 1995.
26. Case BW, Camus M, Siemiatycki J. Trends in Pathologic Diagnosis of Malignant Mesothelioma among Quebec Women 1970-1990. Royal College of Medicine. Montréal. Sept. 1995.
27. Aronson KJ, Siemiatycki J, Dewar R, Gerin M. Occupational Risk Factors for Prostate Cancer. Canadian Society for Epidemiology and Biostatistics, St-John's, Newfoundland, Aug 1995.
28. *Camus M, Siemiatycki J. The Estimation of Past Asbestos Fiber Levels in Quebec Asbestos Mining Towns from 1900 to 1984. Canadian Society for Epidemiology & Biostatistics, St-John's, Newfoundland, Aug 1995.

29. *Camus M, Siemiatycki J, Dewar R. Non-Occupational Asbestos Exposure and Risk of lung Cancer in the Female Population of Asbestos-Mining Towns: Implications for Risk Assessments. Canadian Society for Epidemiology and Biostatistics Meeting, St-John's, Newfoundland, Aug 1995.
30. Payment P, Franco E, Siemiatycki J, Richardson L, Renaud G, Prevost M. Epidemiology studies of tap-water related gastrointestinal illnesses. Water Quality Technology Conference, New Orleans, Nov. 1995.
31. *Fritschi L, Siemiatycki J. Self-assessed versus expert-assessed occupational exposures. Canadian Society for Epidemiology and Biostatistics Meeting, St Johns, Newfoundland, Aug 1995.
32. Payment P, Siemiatycki J, Richardson L, Renaud G. Épidémiologie des maladies gastro-intestinales et respiratoires: incidence, fraction attribuable à l'eau et coûts pour la société. ACFAS, Montréal, May 1996.
33. *Fritschi L, Parent M-É, Siemiatycki J. Gastric cancer and occupation. Australasian Epidemiological Association, Victoria, Australia. July 1996.
34. *Camus M, Case BW, Siemiatycki J. Risk assessment for women living in chrysotile mining towns.1: Environmental exposure assessment. Fourth International Mesothelioma Conference, Philadelphia, May 1997.
35. Case BW, Camus M, Siemiatycki J. Risk assessment for women living in chrysotile mining towns.2: Mesothelioma: observed vs. predicted. Fourth International Mesothelioma Conference, Philadelphia, May 1997.
36. *Camus M, Siemiatycki J. Cancer risks due to non-occupational asbestos exposure. Can. Soc. for Epidemiol. & Biostat. London, Ontario, May 1997.
37. Weston TL, Aronson KJ, Howe GR, Nadon L, Siemiatycki J. Cancer mortality risk in a cohort of working men. Canadian Society for Epidemiology and Biostatistics, London, Ontario, May 1997.
38. *Parent M-É, Siemiatycki J, Menzies L, Fritschi L, Colle E. Can Bacille-Calmette Guérin vaccination prevent insulin-dependent diabetes mellitus (IDDM)? Canadian Society for Epidemiology and Biostatistics, London, Ontario, May 1997.
39. Wolf, S, Siemiatycki J, Beyersmann, D, Jockel, K. H. A case-control study of lung cancer - performance of a job-exposure matrix for cadmium, chromium, nickel, and stainless steel dust. Internat. Epidemiol. Assoc. European Region Meeting. Munster, Germany, Sept. 1997.
40. *Parent, M.E. Siemiatycki J. Exposition professionnelle aux émissions d'essence et de diesel, et cancer du poumon. ACFAS, Quebec, May 1998.
41. *Parent M-É, Siemiatycki J, Boffetta P. Occupational exposure to gasoline and diesel engine emissions and lung cancer. Soc. Epid. Res, Chicago, June 1998.
42. *Parent M-É, Siemiatycki J, Boffetta P, Cohen A. Occupational exposure to gasoline and diesel exhausts and lung cancer. Inter. Soc. Environ. Epid, Boston, August 1998.
43. *Parent M-É, Siemiatycki J, Boffetta P, Cohen A. Gasoline and diesel engine emissions in the workplace and lung cancer. PREMUS-ISEOH '98, Helsinki, Finland, Sept. 1998.
44. Leffondre K, Abrahamowicz M, Rachet B, Siemiatycki J. Modeling smoking history: A comparison of different approaches. Congress of Epidemiology, Toronto, June 2001.
45. Fritschi L, Nadon L, Benke G, Lakhani R, Latreille B, Parent M-É, Siemiatycki J. Validation of expert assessment of occupational exposures X2001 – Occupational Exposure Assessment for Epidemiology and Practice, Gothenburg, Sweden, June 2001.
46. Parent M-É, Siemiatycki J, Desy M. Case-control study of occupational exposures and risk of prostate cancer among farmers. Case-control study of occupational exposures and risk of prostate cancer among farmers, Toronto, June 2001.
47. Siemiatycki J, Camus M, Parent M-É, Richardson L, Desy M, Case BW. Case-control study of pleural mesothelioma among women in Quebec chrysotile mining regions. Inhaled Particles IX (BOHS), Cambridge, United Kingdom, September 2001.
48. Jockel K-H, Wolf S, Ahrens W, Jahn I, Pohlabein H, Beyersmann D, Siemiatycki J. Cadmium as a human lung carcinogen. Jahrestagung der Deutschen Arbeitsgemeinschaft für Epidemiologie (DAE) [Annual convention of the German epidemiology working group], Garmisch-Partenkirchen, Germany, September 2001.

49. Leffondre K, Abrahamowicz M, Siemiatycki J. Comparison of Cox's model versus logistic regression for case-control data with time-varying exposure: a simulation study. Annual Meeting of the Statistical Society of Canada (SSC). Hamilton, Ontario. May 2002.
50. Parent M-É, Siemiatycki J, Desy M. Association between Alcohol Consumption and Each of 23 Types of Cancer in Men. Soc. Epid. Res, Palm Desert, California, June 2002.
51. Leffondre K, Abrahamowicz M, Siemiatycki J. Comparison of Cox's model versus logistic regression for case-control data with time-varying exposure: a simulation study. Society for Epidemiologic Research (SER), Palm Desert, California, June 2002.
52. Rachet B, Parent M-É, Siemiatycki J. Welding Fumes and Lung Cancer: A Case-Control Study, Soc. Epidemiol. Res, Palm Desert, California, June 2002.
53. Rachet B, Abrahamowicz M, Sasco A, Siemiatycki J. Flexible estimation of the distribution of lag in the effects of exposures and interventions. 34th Annual SER Meeting. Palm Desert, California. June 2002.
54. Abrahamowicz M, Mackenzie T, Leffondre K, Du Berger R, Siemiatycki J. Joint modeling of time-dependent and non-linear effects of continuous predictors in survival analysis, with application to reassess the impact of intensity of past smoking on the risks of lung cancer in ex-smokers. 17th International Workshop on Statistical Modeling, Chania, Greece, July 2002.
55. Parent M-É, Siemiatycki J, Desy M. Exposure to chemical agents during leisure activities and risk of non-Hodgkin's lymphoma. Inter. Epidemiology Association, Montréal, August 2002.
56. Leffondre K, Abrahamowicz M, Siemiatycki J. Comparison of Cox's model versus logistic regression for case-control data with time-varying exposure: a simulation study. International Epidemiological Association (IEA), World Congress of Epidemiology, Montréal, Québec, August 2002.
57. Rachet B, Siemiatycki J, Leffondre K, Abrahamowicz M. Exposure-response relationships between cigarette smoking and male lung cancer from a case-control study in Montréal: generalized additive model approach. International Epidemiology Association (IEA) XVI World Congress of Epidemiology. Montréal, Québec. August 2002.
58. Parent M-É, Rousseau M-C, Siemiatycki J, Desy M. Body mass index and male cancer incidence at twelve different sites. Body mass index and male cancer incidence at twelve different sites. Halifax, Nova Scotia, June 2003.
59. Desautels N, Siemiatycki J, Parent M.E. Association between lifetime consumption of coffee, tea, and soft drinks, and incidence of eleven types of cancer: a case-control study. CSEB 2003 Biennial Meeting. Halifax, Nova Scotia, June 2003.
60. Parent M-É, Siemiatycki J, Desy M. Association between beta-carotene intake and risk of cancer at several sites. Society for Epidemiologic Research, Atlanta, Georgia, June 2003.
61. Parent M-É, Siemiatycki J, Laplante O, Desy M. Risk of lung cancer and mesothelioma associated with occupational exposure to Asbestos: A population-based case-control study in Montréal, Canada. International Society for Environmental Epidemiology, Perth, Australia, September 2003.
62. Parent M-É, Siemiatycki J, Laplante O, Désy M. Occupational exposure to asbestos and risk of lung cancer and mesothelioma: results from a population-based-case-control study in Montréal. CARWH Conference. Montréal, Québec, October 2003.
63. Parent M-É, Siemiatycki J, Latreille B, Désy M. Lifetime Occupational Physical Activity and Prostate Cancer Risk. Society for Epidemiologic Research. Salt Lake City, Utah, June 2004.
64. Parent M-É, Rousseau M.C, Siemiatycki J, Boffetta P, Cohen A. Contrasting evidence when using hospital or population controls: the example of the association between exposure to gasoline and diesel exhaust, and lung cancer. 16th conference of the International Society for Environmental Epidemiology (ISEE). New York City, August 2004.
65. De Guire L, Lebel G, Gingras S, Levesque B, Camus M, Provencher S, Case B, Langlois A, Laplante O, Siemiatycki J, Lajoie P. Epidemiology of Asbestos-related diseases in Québec, Canada. EPICOH 2004. Melbourne, Australia, October 2004.
66. Richardson H, Aronson K, Parent M-É, Siemiatycki J. Risk of cancer due to occupational exposure to six types of chlorinated hydrocarbons. EPICOH, Melbourne, Australia, October 2004.

67. De Guire L, Lebel G, Gingras S, Levesque B, Camus M, Provencher S, Case B, Langlois A, Laplante O, Siemiatycki J, Lajoie P. Épidémiologie des maladies reliées à l'exposition à l'amiante au Québec. Board Meeting, Canadian Association of University Teachers. Ottawa, November 2004.
68. Rousseau M-C, Parent M-É, Siemiatycki J. Occupational exposure to lead and risk of cancer in a population-based case-control study from Montréal, Canada. Canadian Association for Research on Work and Health, Vancouver, May 2005.
69. Parent M-É, Rousseau M-C, Siemiatycki J, Desy, M. Using proxy respondents when assessing occupational circumstances in a case-control study of cancer: For better or for worse? Canadian Association for Research on Work and Health, Vancouver, May 2005.
70. *Momoli F, Siemiatycki J, Parent M-É, Abrahamowicz M. Semi-Bayes modeling in a study of lung cancer and multiple occupational chemicals: Comparison of results for five suspected lung carcinogens. Canadian Association for Research on Work and Health, Vancouver, May 2005.
71. *Momoli F, Siemiatycki J, Parent M-É, Abrahamowicz M. Semi-Bayes models: An empirical comparison of modeling approaches in a study of lung cancer and occupational chemicals. Joint Meeting of the Canadian Society for Epidemiology and Biostatistics and the Society for Epidemiologic Research, Toronto, June 2005.
72. Rousseau M-C, Camus M, Case B, Siemiatycki J. Incidence of pleural mesothelioma among women in Québec, 1970-1989: A comparison between asbestos mining and non-mining areas. Joint Meeting of the Canadian Society for Epidemiology and Biostatistics and the Society for Epidemiologic Research, Toronto, June 2005.
73. Leffondre K, Abrahamowicz M, Siemiatycki J. Modeling smoking history using an overall indicator of exposure. Joint Meeting of the Canadian Society for Epidemiology and Biostatistics and the Society for Epidemiologic Research, Toronto, June 2005.
74. Parent M-É, Siemiatycki J, Latreille B, Desy M. Is occupational physical activity associated with cancer risk among men? Joint Meeting of the Canadian Society for Epidemiology and Biostatistics and the Society for Epidemiologic Research, Toronto, June 2005.
75. *Ramanakumar AV, Parent M-É, Menzies R, Camus M, Siemiatycki J. Previous history of lung disease and risk of lung cancer in Montréal. Joint Meeting of the Canadian Society for Epidemiology and Biostatistics and the Society for Epidemiologic Research, Toronto, June 2005.
76. *Benedetti A, Parent M-É, Siemiatycki J. Alcohol consumption and lung cancer risk in two case-control studies in Montréal, Canada. Joint Meeting of the Canadian Society for Epidemiology and Biostatistics and the Society for Epidemiologic Research, Toronto, June 2005.
77. Leffondre K, Abrahamowicz M, Siemiatycki J. Modeling smoking history using an overall indicator of exposure. 26th Annual Conference of the International Society for Clinical Biostatistics (ISCB), Szeged, Hungary, August 2005.
78. Rousseau M.-C, Parent M-É, Siemiatycki J. Exposition professionnelle au plomb et risque de cancer : Étude de cas-témoin basée sur la population de Montréal, Qc. Environnement et santé : Congrès international de l'Association des épidémiologistes de langue française (ADELF), Québec, September 2005.
79. *Ramanakumar AV, Parent M-É, Siemiatycki J. Residential fuel exposures and risk factors for lung cancer: Evidence from two population-based case-control studies in Montréal. Spring Colloquium: Environmental Health Research Network (RRSE), Montréal, May 2006.
80. Sharek M, Rousseau M-C, Siemiatycki J, Parent M-É. Antioxydants et prévention du cancer du poumon : où en sommes-nous? Spring Colloquium: Environmental Health Research Network (RRSE), Montréal, May 2006.
81. Parent M-É, Shareck M, Désy M, Rousseau M-C, Siemiatycki J. Night Work and Risk of Prostate and Colon Cancers. Second North American Congress of Epidemiology, Seattle, June 2006.
82. Rousseau M-C, Parent M-É, Siemiatycki J. Exposure to lead compounds, occupation, and risk of cancer. Second North American Congress of Epidemiology, Seattle, June 2006.
83. *Ramanakumar AV, Parent M-É, Siemiatycki J. Risk of lung cancer from traditional heating and cooking fuels in Montréal. 2006 American Association for Cancer Research (AACR) International Conference on Frontiers in Cancer Prevention Research, Boston, November 2006.

84. Shareck M, Rousseau M-C, Siemiatycki J, Parent M-E. Antioxydants et prévention du cancer du poumon: où en sommes-nous? Second Conference of the Association des étudiantes et étudiants en Santé Publique de l'Université de Montréal, Montréal, February 2007.
85. *Liu A, Abrahamowicz M, Siemiatycki J. Selected Methodological Issues in Testing and Estimating Sex Interactions with Multi-dimensional Exposures: a Simulation Study. 3rd Annual GENESIS (Gender and Sex Determinants of Cardio-vascular Disease: From Bench to Beyond) Montréal Meeting, Montréal, March 8-9, 2007.
86. *Ramanakumar AV, Parent M-É, Siemiatycki J. Exposure to painting-related occupations and risk of lung cancer: results from two case-control studies in Montréal. Oral presentation, Canadian Society for Epidemiology and Biostatistics, Calgary, May 2007.
87. Parent M-É, Rousseau M-C, Pintos J, Nicolau B, Désy M, Siemiatycki J. Are men reporting a history of anxiety, depression or insomnia at increased risk of cancer? Annual Meeting of the Canadian Society for Epidemiology and Biostatistics, Calgary, May 2007.
88. *Pintos J, Parent M-É, Rousseau M-C, Siemiatycki J. Risk of mesothelioma associated with occupational exposure to asbestos: Evidence from two case-control studies in Montréal, Canada. Annual Meeting of the Canadian Society for Epidemiology and Biostatistics, Calgary, May 2007.
89. Shareck M, Rousseau M-C, Siemiatycki J, Parent M-É. Dietary antioxidants intake and risk of lung cancer: A population-based case-control study. Poster presentation, 2007 CSEB Student Conference, Calgary, Alberta, May 2007.
90. Shareck M, Rousseau M-C, Siemiatycki J, Parent M-É. Dietary antioxidants intake and risk of lung cancer: a population-based case-control study. Poster presentation, Spring 2007 Conference of the Environmental Health Research Network (RRSE-FRSQ), Montréal, May, 2007.
91. Parent M-É, Rousseau M-C, Pintos J, Nicolau B, Désy M, Siemiatycki J. Is there a link between stress at work and cancer risk? Annual Meeting of the Society for Epidemiologic Research, Boston, June 2007. American Journal of Epidemiology 2007;165(11)Suppl:S3.
92. Nicolau B, Parent M-É, Rousseau M-C, Désy M Siemiatycki J. Childhood socioeconomic position in relation to cancer: evidence from a Canadian population based case-control study. Annual Meeting of the Society for Epidemiologic Research, Boston, June 2007. American Journal of Epidemiology 2007;165(11)Suppl:S77.
93. *Pintos J, Parent M-É, Rousseau M-C, Siemiatycki J. Occupational Exposure to Asbestos and Man-Made Vitreous Fibers, and Risk of Lung Cancer: evidence from two case-control studies in Montréal, Canada. Annual Meeting of the Society for Epidemiologic Research, Boston, June 2007. American Journal of Epidemiology 2007; 165(11) Suppl: S102.
94. Rousseau M-C, Parent M-É, Desy M, Siemiatycki J. History of allergic disease and risk of cancer. Annual Meeting of the Society for Epidemiologic Research, Boston, June 2007. American Journal of Epidemiology 2007;165(11)Suppl:S100.
95. *Momoli F, Parent M-É, Abrahamowicz M, Nadon L, Lakhani, Latreille B, Krewski D, Siemiatycki J. Lung cancer risk from selected occupational chemicals. Annual Meeting of the Society for Epidemiologic Research, Boston, June 2007. American Journal of Epidemiology 2007; 165(11)Suppl:S102.
96. *Momoli F, Parent M-É, Abrahamowicz M, Nadon L, Lakhani, Latreille B, Krewski D, Siemiatycki J. Lung cancer risk from selected occupational chemicals. Annual Meeting of the Society for Epidemiologic Research, Boston, June 2007. American Journal of Epidemiology 2007; 165(11) Suppl: S102.
97. *Liu A, Abrahamowicz M, Siemiatycki J. Testing and estimating interactions with multi-dimensional exposures: A simulation study. 28th Annual Conference of the International Society for Clinical Biostatistics, Alexandroupolis, Greece, July-August 2007.
98. Parent M-E, Rousseau M-C, Siemiatycki J, Goldberg M, Aprikian F, Saad F, Karakiewicz P. Main determinants of response rates in a large population-based case-control study of environmental, lifestyle and genetic factors, and prostate cancer in Montréal, Canada. Making Connections: A Canadian Cancer Research Conference, Toronto, November 15-17, 2007.
99. *Liu A, Abrahamowicz M, Siemiatycki J. Testing and estimating interactions with multi-dimensional exposures: A simulation study. 10e Congrès annuel des étudiants, stagiaires et résidents du centre de recherche du CHUM. Montréal, December 18, 2007.

100. Shareck M, Rousseau M-C, Siemiatycki J, Parent M-É. Fruit and vegetables, and risk of lung cancer, by smoking intensity. Society for Epidemiologic Research, Chicago, June 2008.
101. Parent M-É, Siemiatycki J, Goldberg M, Désy M. Birth weight, obesity during childhood, adolescence and adulthood, and prostate cancer - Preliminary data from the PROTEuS study. Society for Epidemiologic Research, Chicago, June 2008. *American Journal of Epidemiology* 2008 ; 167 (Suppl.): S62
102. Leffondré K, Wynant W, Cao Z, Siemiatycki J. A comprehensive smoking index to model smoking history in cancer studies. Society for Epidemiologic Research, Chicago, June 2008.
103. *Beveridge R, Pintos J, Parent M-É, Asselin J, Siemiatycki J. Risk of lung cancer after occupational exposure to cadmium, chromium VI, and nickel. Society for Epidemiologic Research, Chicago, June 2008.
104. *Liu A, Abrahamowicz M, Siemiatycki J. Methodological challenges in testing and estimating interactions with multi-dimensional exposures. Society for Epidemiologic Research, Chicago, June 2008.
105. Leffondré K, Wynant W, Cao Z, Abrahamowicz M, Siemiatycki J. A weighted Cox model for case-control data with time-dependent exposures. 29th Annual Conference of the International Society for Clinical Biostatistics, Copenhagen, August 17-21, 2008.
106. Koushik A, Parent M-É, Siemiatycki J. Characteristics of menstruation and pregnancy and the risk of lung cancer in women. 6th Annual American Association for Cancer Research, Frontiers in Cancer Prevention Research Meeting, Philadelphia, November 16-19 - 2008
107. Olsson A.C., Gustavsson P, Kromhout H, Siemiatycki J, et al. Pooled Analyses on Diesel Motor Exhaust and Lung Cancer in Europe and Canada. Poster presentation. 29th ICOH International Congress on Occupational Health, Cape Town, South Africa, March 2009.
108. Shareck M, Rousseau M-C, Siemiatycki J, Parent M-É. Dietary Intake of Antioxidants and Risk of Four Histological Subtypes of Lung Cancer: a Population Based Case-Control Study. Oral presentation at the Canadian Society for Epidemiology and Biostatistics (CSEB) and Association of Public Health Epidemiologists in Ontario (APHEO) Joint Conference, Ottawa, Ont. May 2009
109. Nkosi MT, Rousseau M-C, Parent M-É, Siemiatycki J. Comparison of indicators of financial situation in the context of an epidemiological study. Poster presentation at the Canadian Society for Epidemiology and Biostatistics (CSEB) and Association of Public Health Epidemiologists in Ontario (APHEO) Joint Conference, Ottawa Ont, May 2009.
110. Nkosi MT, Rousseau M-C, Parent M-É, Siemiatycki J. Studying socio-economic status and lung cancer risk; How important Is the modelling of smoking? Poster presentation at the Canadian Society for Epidemiology and Biostatistics (CSEB) Student Conference, Ottawa Ont, May 2009.
111. Rousseau M-C Parent M-E, Nicolau B, Koushik A, Siemiatycki J. Body mass index and lung cancer risk in a population-based case-control study from Montréal, Canada. Poster presentation at the 42nd Annual Meeting of the Society for Epidemiological Research (SER) Meeting Anaheim Ca, June 23-26 2009.
112. *Pintos J, Parent M-E, Siemiatycki J. Occupational exposure to diesel engine emissions and risk of lung cancer; evidence from case-control study in Montréal. Oral presentation. 42nd Annual Meeting of the Society for Epidemiologic Research Meeting (SER), Anaheim, June 23-26 2009.
113. *Perron S, Jacques L, Siemiatycki J, Ducharme F. Home multifaceted environmental interventions to improve asthma control: A systematic review. 137th Annual Meeting of the American Public Health Association (APHA), November 7-11 2009, Philadelphia, PA.
114. *Wynant W, Siemiatycki J, Parent M-E, Rousseau M-C. Exposition professionnelle au plomb et risque de cancer du poumon. Présentation orale, Congrès Armand Frappier, Bromont (Qc), Novembre 2009.
115. Kâ K, El-Zein M, Parent M-É, Siemiatycki J, St-Pierre Y, Rousseau M-C. Antécédent médical d'asthme ou d'eczéma et risque de cancer: une étude cas-témoins à base populationnelle. Présentation orale, Congrès Armand Frappier, Bromont (Qc), Novembre 2009.
116. Soskolne CL, Jhangri GS, Scott HM, Brenner DR, Siemiatycki J, Lakhani RA, Gérin M, Dewar R, Miller AB, Risch H. A population based case-control study of occupational exposure to acids and the risk of lung cancer: evidence for specificity with laryngeal cancer. Poster presentation at INSIGHTS'09, School of Public Health, University of Alberta, Edmonton, Alberta, November 12 2009.

117. *Pintos J, Lavoué L, Van Tongeren M, Kauppinen T, Richardson L, Sleguwenhoek A, Lakhani R, Cardis E, Siemiatycki J. Comparison of exposure estimates in FINJEM with expert-based assessments performed in Montréal. Part I: Exposure prevalence. Oral presentation. Epidemiology in Occupational Health (EPICOH), Taipei, April 2010.
118. Lavoué J, Pintos J, Van Tongeren M, Kauppinen T, Richardson L, Sleguwenhoek A, Lakhani R, Cardis E, Siemiatycki J. Comparison of exposure estimates in FINJEM with expert-based assessments performed in Montréal. Part II: Exposure levels. Oral presentation. Epidemiology in Occupational Health (EPICOH), Taipei, April 2010.
119. *Christensen KY, Naidu A, Parent M-E, Pintos J, Siemiatycki J, Koushik A. The risk of lung cancer related to dietary intake of flavonoids. Annual Meeting of the Society for Epidemiologic Research (SER), Seattle, Washington, June 2010.
120. *Wynant W, Siemiatycki J, Parent M-E, Rousseau M-C. Occupational exposure to lead compounds and lung cancer. SER, Seattle, June 2010.
121. *Liu A, Abrahamowicz M, Siemiatycki J. Methodological challenges in testing and estimating interactions with multi-dimensional exposures. Annual Meeting of the Society for Epidemiologic Research (SER), Seattle, June 2010.
122. Rousseau M-C, Conus F, Parent M-É, Siemiatycki J. History of allergic diseases and risk of lung cancer. Poster presentation. Third North American Congress of Epidemiology, Montréal, June 2011. Am. J. Epidemiol. (2011) 173 (suppl 11):S29.
123. Leffondré K, Wynant W, Cao Z, Siemiatycki J. A comprehensive smoking index to model smoking history in cancer studies. Poster presentation. Third North American Congress of Epidemiology, Montréal, June 2011. Am. J. Epidemiol. (2011) 173 (suppl 11):S29.
124. *Liu A, Abrahamowicz M, Siemiatycki J. When Interaction Estimates in Logistic Regression are Confounded? Oral presentation. Third North American Congress of Epidemiology, Montréal, June 2011. Am. J. Epidemiol. (2011) 173 (suppl 11):S29.
125. *Vallièrès É, Siemiatycki J, Lavoué J, Pintos J, Parent M-E. Risk of lung cancer after exposure to welding fumes in two population-based case-control studies. Poster presentation. Third North American Congress of Epidemiology, Montréal, June 2011. Am. J. Epidemiol. (2011) 173 (suppl 11):S29.
126. *Mahboubi A, Koushik A, Siemiatycki J, Lavoué J, Rousseau M-C. Occupational exposure to formaldehyde and risk of lung cancer. Poster presentation Third North American Congress of Epidemiology, Montréal, June 2011. Am. J. Epidemiol. (2011) 173 (suppl 11):762-S.
127. *Mahboubi A, Abrahamowicz M, Siemiatycki J. Simulation study of multiple logistic regression estimates for multiple correlated exposures measured with errors. Poster presentation. Third North American Congress of Epidemiology, Montréal, June 2011. Am. J. Epidemiol. (2011) 173 (suppl 11):S29.
128. *Al-Zoughool M, Pintos J, Richardson L, Parent M-É, Ghadirian P, Krewski D, Siemiatycki J. Exposure to environmental tobacco smoke and risk of lung cancer: evidence from a case-control study in Montréal, Canada. Poster presentation. Third North American Congress of Epidemiology, Montréal, Quebec, Canada, June 2011. Am. J. Epidemiol. (2011) 173 (suppl 11):S29.
129. El-Zein M, Parent M-É, Nicolau B, Koushik A, Siemiatycki J, Rousseau M-C. Smoking, body mass index and lung cancer risk. Poster presentation. Third North American Congress of Epidemiology, Montréal, Quebec, Canada, June 2011. Am. J. Epidemiol. (2011) 173 (suppl 11):S29.
130. Karp I, Abrahamowicz M, Leffondré K, Siemiatycki J. Development of a method for assessment of risk of lung cancer. Poster presentation. Third North American Congress of Epidemiology, Montréal, Quebec, June 2011. Am. J. Epidemiol. (2011) 173 (suppl 11):S29.
131. Momoli F, Parent M-E, Siemiatycki J, Platt R, Richardson L, et al. A probabilistic multiple-bias model applied to a study of mobile phone use and risk of glioma. Third North American Congress of Epidemiology, Montréal, Quebec, June 2011. Am. J. Epidemiol. (2011) 173 (suppl 11):S29.
132. Siemiatycki J, Richardson L, Kincl L, Schlaefel K, Cardis E. Oral presentation. INTEROCC Study: Social Class and The Risk of Glioma Brain Tumours. International Society for Environmental Epidemiology (ISEE), Barcelona, Spain, September 2011.

133. Siemiatycki J, Richardson L, Kincl L, Schlaefter K, Cardis E. Oral presentation. INTEROCC Study: Social Class and The Risk of Meningioma Brain Tumours. International Society for Environmental Epidemiology (ISEE), Barcelona, Spain, September 2011.
134. Kendzia B, Pesch B, Jöckel K.-H, Kromhout H, Straif K, Brüning T, on behalf of the SYNERGY Working Group. Lung cancer risks of welding in a pooled analysis of case-control studies. Oral presentation. 7th International Conference on Science of Exposure Assessment (X2012), Edinburg, Scotland, July 2012.
135. Olsson A.C, Vlaanderen J, Vermeulen R, Kromhout H, Pesch B, Straif Kurt on behalf of the SYNERGY study Group. Improved risk estimation through advanced exposure modelling in community-based studies: the example of occupational asbestos exposure in the SYNERGY project. Oral presentation. 7th International Conference on Science of Exposure Assessment (X2012), Edinburgh, Scotland, July 2012.
136. *Lacourt A, Lavoué J, Labrèche F, Siemiatycki J. Gender differences in occupational exposures assessed by experts in a community based-case control study of lung cancer. Oral presentation 7th International Conference on the Science of Exposure (X2012), Edinburgh, Scotland, July 2012.
137. *Pasquet R, Karp I, Siemiatyck J, Koushik A. Intake of black tea and coffee and the risk of lung cancer. E-poster. UICC World Cancer Congress, Montréal, Quebec, 27-30 August 2012.
138. *Vallièrès E, Siemiatycki J, Lavoué J, Pintos J, Parent M-E. Risk of three histological types of lung cancer after exposure to welding fumes. Poster presentation, UICC World Cancer Congress, Montréal, Quebec, 27-30 August 2012.
139. *Rivera M, *Vizcaya D, Pintos J, Abrahamowics M, Siemiatycki J. Association between exposure to engine emissions and lung cancer. 23rd International Conference on Epidemiology in Occupational Health (EPICOH), Utrecht, Netherlands, 18-21 June 2013.
140. *Vizcaya D, Lavoué J, Bégin D, Pintos J., Richardson L, *Rivera M, Siemiatycki J. Risk of eight types of cancer and cleaning-related exposures in a case-control study. 23rd International Conference on Epidemiology in Occupational Health (EPICOH), Utrecht, Netherlands, 18-21 June 2013.
141. *Vizcaya D, Lavoué J, Pintos J, Richardson L, Siemiatycki J. Lung cancer and cleaning-related exposures: results from two case-control studies. 23rd International Conference on Epidemiology in Occupational Health (EPICOH), Utrecht, Netherlands, 18-21 June 2013.
142. Turner M-C, Benke G, Bowman J, et al. Occupational exposure to extremely low frequency magnetic fields and brain tumour risks in the INTEROCC study. Environment and Health – Joint meeting of the International Society for Environmental Epidemiology (ISEE), the International Society for Exposure Sciences (ISES) and the International Society for Indoor Air Quality (ISIAQ), Basel, Switzerland, 19-23 August 2013.
143. Lavoué J, Labrèche F, Richardson L, Goldberg M, Parent M-E, Siemiatycki J. CANJEM: a general population job exposure matrix based on past expert assessments of exposure to over 250 agents. 24th International Conference on Epidemiology in Occupational Health (EPICOH), Chicago, Illinois, 24-27 June 2014. [abstract] Occupational & Environmental Medicine. 2014;71 (Suppl 1):A48.
144. *Ho V, Parent M-E, Pintos J, Abrahamowicz M, Gauvin L. Siemiatycki J, Koushik A. Lifetime occupational physical activity and lung cancer risk. 17^{ème} Congrès des étudiants, stagiaires et résidents du CRCHUM, Montréal, Quebec, December 2014.
145. Turner M C, Sadetzki S, Eastman Langer C, Figuerola J, Armstrong BK, Chetrit A, Giles GG, Krewski D, Hours M, McBride /ML, Parent M-E, Richardson L, Siemiatycki J, Woodward A, Cardis E. Impact of case:control matching strategies on associations between cellular telephone use and glioma risk in the INTERPHONE study. International Society for Environmental Epidemiology (ISEE), Seattle, Washington, 25 August 2014.
146. *Dutczak H, Siemiatycki J, Koushik A. Exposure to stressful life events and lung cancer risk. 10^{ème} Colloque Annuel de l'Association des Étudiantes et Étudiant en Santé Publique de l'Université de Montréal, Quebec, February 2015.
147. *Xu M, Richardson L, Campbell S, Siemiatycki J. Trends and Characteristics of Response Rates in Case-Control Studies of Cancer. 10^{ème} Colloque Annuel de l'Association des Étudiantes et Étudiant en Santé Publique de l'Université de Montréal, Montréal, Quebec, February 2015.

148. *Pasquet R, Cardis E, Richardson L, Lavoué J, Siemiatycki J, Koushik A. L'association entre l'exposition occupationnelle aux métaux et le cancer du cerveau. 10ème Colloque Annuel de l'Association des Étudiantes et Étudiant en Santé Publique de l'Université de Montréal, Montréal, Quebec, February 2015.
149. *Dutczak H, Siemiatycki J, Koushik A. Stressful life events and lung cancer risk. Canadian Society for Epidemiology and Biosatistics (CSEB), Mississauga, Ontario, 1-4 June 2015.
150. *Pasquet R, Cardis E, Richardson L, Lavoué J, Siemiatycki J, Koushik A. The association between occupational exposure to metals and metalloids and brain cancer risk. Canadian Society for Epidemiology and Biosatistics (CSEB), Mississauga, Ontario, 1-4 June 2015.
151. *Xu M, Richardson L, Campbell S, Siemiatycki J. Trends and Characteristics of Response Rates in Case-Control Studies of Cancer. Canadian Society for Epidemiology and Biosatistics (CSEB), Mississauga, Ontario, 1-4 June 2015.
152. Behrens T, Groß I, Siemiatycki J, Conway D, Jöckel K-H, Olsson A, Kromhout H, Straif K, Schüz J, Hovanec J, Kendzia B, Pesch B, Brüning T. Niedriges berufliches Prestige, soziale Mobilität und Lungenkrebs – die SYNERGY-Studie. German Epidemiology Association (DGEpi), Potsdam, Germany, September 2015.
153. *Carrier M, Kestens Y, Siemiatycki J. Nuisances environnementales et risques pour la santé. AQTR, Montréal, Quebec, 15 September 2015.
154. *Sauvé JF, Siemiatycki J, Labrèche F, Lavoué J. Development of the CANJEM job exposure matrix: Bayesian modelling of occupational exposures assigned by experts to over 30000 jobs spanning 1920-2005. The International Society of Exposure Science (ISES), Henderson, Nevada, 18-22 October 2015.
155. Vila J, Bowman JD, Richardson L, Kincl L, Conover D, van Tongeren M, Mann S, Vecchia P, McLean D, Cardis E, on behalf of the INTEROCC Study Group. Assessing cumulative exposures to electromagnetic fields: From source-based measurements to individual lifetime exposure estimates. The International Society of Exposure Science (ISES) Henderson, Nevada, 18-22 October 2015.
156. *Karumanchi S, Hatsopoulou M, Richardson L, Siemiatycki J. Methodology for exposure assessment for UFPs in the Grand Montréal Region. Oral presentation. 11th Annual Symposium of the Student Association in Public Health at the Université de Montréal (AÉÉSPUM), Montréal, Quebec, 9 February 2016.
157. *Carrier M, Apparicio P, Kestens Y, Séguin AM, Pham H, Crouse D, Siemiatycki J. Application of a global environmental equity index in Montréal: diagnostic and further implications, AAG, San Francisco, California, 30 March 2016.
158. *Carrier M, Apparicio P, Kestens Y, Séguin A-M, Pham H, Crouse D, Siemiatycki J. Application d'un indice d'équité environnementale à Montréal: établissement d'un diagnostic pour cibler les secteurs et les groupes les plus vulnérables, ACFAS, Montréal, Quebec, 11 May 2016.
159. *Carrier M, Kestens Y, Crouse D, Siemiatycki J. Lung cancer and exposure to Nitrogen Dioxide and Traffic in Montréal, World Conference on Transport Research, Shanghai, China, 10 July 2016.
160. *Xu M, Richardson L, Campbell S, Pintos J, Siemiatycki J. Patterns and trends in quality of response rate reporting in case-control studies of cancer. 18th Congress of Students, Interns and Residents of CRCHUM, Montréal, Quebec, 4 May 2016.
161. *Xu M, Richardson L, Campbell S, Pintos J, Siemiatycki J. Time trends and study design determinants of response rates in case-control studies of cancer. 18th Congress of Students, Interns and Residents of CRCHUM, Montréal, Quebec, 4 May 2016.
162. *Karumanchi S, Hatsopoulou M, Richardson L, Thierry B, Goldberg M, Siemiatycki J. Land use regression model of UFPs in the Grand Montréal Region. Oral presentation. Canadian Society for Epidemiology and Biostatistics, Winnipeg, Manitoba, 8-10 June 2016.
163. *Xu M, Richardson L, Campbell S, Pintos J, Siemiatycki J. Subject response rates in case-control studies of cancer: quality of reporting, time trends, and study design determinants. Epidemiology Congress of the Americas, Miami, Florida, 21-24 June 2016.
164. *Rémen T, Siemiatycki J, Lavoué J. Impact of inter-coder differences in occupation and industry classification coding on exposure estimates obtained via job-exposure matrix: example of gasoline engine

- emissions in CANJEM. Oral presentation. 25th EPICOH - Epidemiology in Occupation Health Conference, Barcelona, Spain, 4-7 September 2016.
165. *Sauvé JF, Lavoué J, Siemiatycki J, Parent ME. Evaluation of a hybrid expert approach for retrospective assessment of occupational exposures in a population-based study of prostate cancer in Montréal, Canada. Oral presentation. 25th EPICOH - Epidemiology in Occupation Health Conference, Barcelona, Spain, 4-7 September 2016.
166. *Pasquet R, Cardis E, Richardson L, Lavoué J, Siemiatycki J, Koushik A. The association between occupational exposure to metals and metalloids and brain cancer risk. 25th EPICOH - Epidemiology in Occupation Health Conference, Barcelona, Spain, 4-7 September 2016.
167. Russ D, Rémen T, Ho KY, Chow WH, Davis F, Hofmann J, Huang H, Purdue M, Schwartz K, Siemiatycki J, Zhang Y, Silverman D, Johnson C, Lavoué J, Friesen M. Recommendations for prioritizing expert review of free-text job descriptions that underwent computer-based coding using the SOCcer algorithm. 25th EPICOH - Epidemiology in Occupation Health Conference, Barcelona, Spain, 4-7 September 2016.
168. *Sauvé JF, Labrèche F, Richardson L, Goldberg MS, Parent MÉ, Siemiatycki J, Lavoué J. Development of the CANJEM Canadian general-population job-exposure matrix from past expert evaluations. Oral presentation. Canadian Association for Research on Work and Health (CARWH) conference, Toronto, Ontario, October 2016.
169. *Rémen T, Siemiatycki J, Lavoué J, Verner MA. Impact of inter-coder differences in occupation and industry classification coding on exposure estimates obtained via job-exposure matrix: example of gasoline engine emissions in CANJEM. Poster. International Society of Exposure Science (ISES) 2016 Annual Meeting, Utrecht, Netherlands, 9-13 October 2016.
170. Grundy A, Ho V, Parent ME, Siemiatycki J, Koushik A. Lifetime recreational moderate-to vigorous physical activity and the risk of ovarian cancer by subtype. Poster presentation. 2016 American Institute for Cancer Research (AICR) Research Conference, North Bethesda, Maryland, 14-16 November 2016.
171. Grundy A, Ho V, Parent ME, Siemiatycki J, Koushik A. The impact of menopausal status on the association between moderate-to-vigorous physical activity among participants in the Prevention of OVArian Cancer in Quebec (PROVAQ) study. Oral Presentation. Canadian Society for Epidemiology and Biostatistics 2017 Biennial Conference, Banff, Alberta, 1 June 2017
172. Bowman JD, Vila J, Richardson L, Kincl L, Cardis E on behalf of the INTEROCC Study Group. Occupational Exposures to Radio-frequency Electric Fields Assessed for the INTEROCC Study of Brain Cancer. Oral presentation. American Industrial Hygiene Association conference, Seattle, Washington, 4-7 June 2017.
173. *Karumanchi S, Siemiatycki J, Hatzopoulou M. Some challenges in measuring ultra-fine particles and developing a land use regression model. Oral presentation. Canadian Society for Epidemiology and Biostatistics (CSEB) 2017 Biennial Conference, Banff, Alberta, 30 May 2017.
174. *Sauvé JF, Davies HW, Parent MÉ, Peters CE, Siemiatycki J, Sylvestre MP, Lavoué J. Development of quantitative estimates of wood dust exposure in a Canadian general population job-exposure matrix based on past expert assessments. 26th Conference on Epidemiology in Occupational Health (EPICOH 2017), Edinburgh, Scotland, August 2017.
175. Ho V, Xu M, Pintos J, Lavoué J, Abrahamowicz M, Rousseau M.C, Richardson L, Siemiatycki J. Occupational exposures to leaded and unleaded gasoline engine emissions and lung cancer risk. Canadian Cancer Research Conference, Vancouver, British Columbia, 5-7 November 2017.
176. Lequy E, Siemiatycki J, Leblond S, et al. Moss biomonitoring as an alternative to assess exposure to atmospheric metals in environmental epidemiology: the example of the bramm network and the gazel cohort. Poster. SEE Young 2018, Early Career Researchers Conference on Environmental Epidemiology – Together for a Healthy Environment, Freising, Germany, 19–20 March 2018. Occup Environ Med 2018;75:A27.
177. Ho V, Parent MÉ, Lavoué J, Zhu Y, Siemiatycki J, Koushik A. Gender Differences in Occupational Physical Activity. Oral presentation. ISES-ISEE 2018 Joint Annual Meeting, Ottawa, Ontario. 26-30 August 2018.

178. *Xu M, Ho V, Siemiatycki J. Association between occupational exposure to textile fibre dusts and lung cancer in a population-based case-control study in Montréal: a preliminary analysis comparing results from three analytical methods. Oral presentation. ISES-ISEE 2018 Joint Annual Meeting, Ottawa, Ontario, 26-30 August 2018.
179. Zhu Y, Lavoué J, Parent MÉ, Siemiatycki J, Koushik A, Ho V. Occupational Physical Activity and Lung Cancer Risk among Participants of the Alberta's Tomorrow Project. Poster. ISES-ISEE 2018 Joint Annual Meeting, Ottawa, Ontario, 26-30 August 2018.
180. *Karumanchi S, Siemiatycki J, Richardson L, Hatzopoulou M. Estimating exposure to Ultrafine Particles in the Greater Montreal Area among case-control study subjects: Comparison of classical land use regression model with a model based on Bayesian principles - Proposal. Poster. ISES-ISEE 2018 Joint Annual Meeting, Ottawa, Ontario, 26-30 August 2018.
181. van Tongeren M, Dirkx E, Lavoué J, Siemiatycki J, Ho V. Assessment of Occupational Exposure to Endocrine Disrupting Agents. Poster. ISES-ISEE 2018 Joint Annual Meeting, Ottawa, Ontario, 26-30 August 2018.

* First author was under supervision of J. Siemiatycki when this work was carried out

GRANTS AND CONTRACTS RECEIVED

1. Comparison of three methods for conducting household health surveys; Nat. Health Res & Devel. Prog. (NHRDP); \$27,000; 1974-76.
2. Pilot study of a case-control monitoring system for discovering occupational carcinogens; Conseil de la recherche en santé (CRSQ); \$80,000; 1978-1980.
3. Établissement du jeune chercheur; CRSQ; \$15,000; 1979-80.
4. Analyse de santé auprès de 1600 ménages montréalais; Ministère des affaires sociales (MAS); \$12,708; 1980
5. Dépistage des facteurs cancérigènes de l'environnement professionnel montréalais: étude pilote; Commission des accidents du travail; \$59,093 ; 1980-82.
6. Registry of patients with Juvenile Onset Diabetes in Québec; NHRDP; \$35,478*; 1980-85; (P.I. Dr E. Colle).
7. Secondary analysis of a health survey in Montréal: methodologic issues and comparison of morbidity and health care utilization between social groups; NHRDP-H&W Can.; \$15,000; 1981-82.
8. Exposure-based case-control approach to discovering occupational carcinogens; NHRDP-H&W Can.; \$129,258; 1981-83.
9. An exposure-based case-control approach to discovering occupational carcinogens; NCIC; \$131,842; 1981-83.
10. Variation in sex ratios of cancer between geographic areas; NCIC; \$3,227; 1982-84.
11. Équipe associée en épidémiologie des cancers professionnels (Team grant); Institut de la recherche en santé et sécurité du travail (IRSST); \$1 120,000; 1982-85.
12. Formaldehyde et cancer; IRSST; \$9,500; 1983.
13. Retrospective cohort study in the Montréal fur industry; IRSST; \$34,019; 1983-85.
14. Statistical analysis of a case-control study designed to discover occupational carcinogens; NHRDP-H&W Can.; \$484,022; 1985-87.
15. Completion of chemical coding of exposures in a case-control study designed to discover occupational carcinogens; IRSST; \$102,180; 1986.
16. Risks of cancer due to exposure to asbestos in a range of occupations; IRDA; \$61,206; 1986-87.
17. Biological estimation of exposure: a tissue registry for the identification and quantification of occupational carcinogens; NCIC; \$3,500*; 1986-87; (P.I. Dr B. Case)
18. Development of a proposal to study cancer risk and non-occupational exposure to asbestos; H&W Can.; \$29,500; 1987-88.
19. Evaluation of cancer risk and occupational exposure to formaldehyde; H&W Can.; \$30,000; 1987-88.
20. A genetic-epidemiologic study of breast cancer; NIH-NCI; \$90,945(US)*; 1987-92; (P.I. Dr. R. Haile).

21. Scholar award; NHRDP-H&W Can.; \$298,689; 1987-93.
22. An intervention trial to assess the risks of gastro-intestinal illness associated with consumption of treated tap water; NHRDP; \$225,000*; 1987-89; (P.I. Dr P. Payment).
23. Evaluation of cancer risk and occupational exposure to polycyclic aromatic hydrocarbons; H&W Can.; \$29,500; 1988-89.
24. Evaluation of cancer risk and occupational exposure to benzene, toluene and xylene; H&W Can, \$40,000; 1988-89.
25. Health risks due to chrysotile asbestos in the non-occupational environment: a workshop to evaluate a research protocol; H&W Can, \$20,000; 1988-89.
26. A population-based, case-control study of occupational exposure to sulphuric acid and the development of laryngeal cancer: an augmented secondary data analysis; NHRDP; \$11,120*; 1988-89; (P.I. Dr. C. Soskolne).
27. Mortality due to asbestos in the general environment of the Quebec mining areas; H&W Can.; \$130,000; 1989-90.
28. A case-control approach to discovering occupational carcinogens: an analysis of data; NHRDP; \$55,508; 1989-90.
29. Continued analysis of a large case control study of many types of cancer: occupational and non-occupational risk factors; NHRDP; \$463,827 1988-1992
30. Risk of cancer due to cigarette smoking - results of a multi-site case-control study; H&W Can.; \$30,000; 1989-90.
31. Étude sur la validité de matrice emploi-expositions multisectorielles; IRSST; \$18,207*; 1990-1992; (P.I. Dr. M. Gérin).
32. Équipe en épidémiologie environnementale (Team grant in environmental epidemiology) ; Fonds de recherche en santé du Québec; \$526,297; 1990-1994.
33. Leukemia in children due to parental occupational exposures; NHRDP; \$108,000*; 1990-1994; (P.I. Dr Claire Infante-Rivard).
34. Risk of cancer due to exposure to chlorinated solvents - results of a multi-site case-control study; H & W Can.; \$30,000; 1991-92.
35. Non-occupational exposure to Quebec chrysotile asbestos and risk of cancer retrospective assessment of exposure; H & W Can.; \$60,000; 1991-92.
36. Feasibility of epidemiologic methods to investigate health outcomes near waste sites; H & W Canada; \$33,000; 1991-92
37. A pilot study to evaluate the prevalence of hip arthritis in the Montréal urban setting, and an evaluation of methods of recruitment of a population aged 65+; Montréal General Hospital Clinical Epidemiology; \$15,000*; 1991-92; (P.I. Dr. J. Esdaile).
38. Non-occupational exposure to Quebec chrysotile asbestos and risk of cancer; mesothelioma ascertainment; NHRDP; \$164,000; 1991-95.
39. Multivariate Regression Analyses of Occupational Risk Factors for Several Types of Cancers; NHRDP; \$128,827; 1992-96.
40. Development of a Job-Exposure Matrix for Use in Epidemiologic Case-Control Studies of Occupational Risk Factors; NHRDP; \$85,003; 1992-95.
41. A prospective epidemiological study of gastrointestinal health effects due to consumption of drinking water. E.P.A. (US)/ NHRDP/ Nat. Water Res. Inst.; \$300,000*; 1993-95. (P.I.: Dr. P. Payment)
42. A population-based, case-control study of occupational exposure to acidifying agents and the development of lung cancer: an augmented, secondary data analysis. NHRDP; \$72,220*; 1993-1995. (P.I. Dr. C. Soskolne).
43. Scholar award; NHRDP-Health Canada; \$126,990; 1993-95.
44. Équipe en épidémiologie environnementale (Team grant in environmental epidemiology) ; Fonds de recherche en santé du Québec; \$242,652; 1994-1998.
45. Examen pathologique de cas présumés de mésothéliome recensés chez des femmes depuis 1970 dans des hôpitaux du québec. Health and Welfare Canada. \$30,000. 1994.

46. Cohort Study of a Ten Percent Sample of the Canadian Labour Force. NHRDP; \$12,000*; 1994-97. (P.I. Dr. K. Aronson)
47. A health survey of persons living near the Miron Quarry Sanitary Landfill site, Montréal: a pilot study. NHRDP; \$88,931 ; 1994-95. (P.I. Dr. M. Goldberg)
48. Occurrence of pathogenic microorganisms in water from St Laurent hydrological basin. FRSQ/ NHRDP & St Laurent Vision 2000; 1995-97. (P.I. P Payment)
49. Case-control study of lung cancer and environmental tobacco smoke; Health Canada; \$544,344; 1995-1997.
50. Case-control study of lung cancer and occupational exposures: NHRDP; \$840,000.; 1995-1998.
51. Occupational exposure to solvents and risk of breast cancer; National Cancer Institute of Canada; \$300,000*; 1995-1997. (P.I.: M Goldberg).
52. Scholar Award; NHRDP-Health Canada; \$263,329, 1995-1998.
53. Reanalysis of US data relating general mortality to air pollution; Health Effects Institute; 1998-2000 (P.I. D Krewski)
54. A case-control study of occupational risk factors for lung cancer; Medical Research Council of Canada; \$554,757, 1998-2001
55. Évaluation du risque de cancer du poumon et de mésothéliome associé à l'exposition à l'amiante chez les travailleurs de la région montréalaise; Ministère de la Santé et des Services sociaux; \$12,000. 1998.
56. Feasibility of a case-control study of the association between cell phone use and brain, salivary gland cancer and acoustic neurinoma. International Agency for Research on Cancer; \$12,000, 1998.
57. Inorganic particulate retained dose markers in lung cancer and mesothelioma. CIHR (P.I. Bruce Case) \$66,096. 1999-2003
58. Distinguished Scientist Award, Medical Research Council of Canada; \$330,000; 1999-2004.
59. Évaluation du risque de mésothéliome associé à l'exposition à l'amiante chez les femmes de la région minière; Ministère de la Santé et des Services sociaux; \$27,500. 1999-2000.
60. Program of research in environmental epidemiology of cancer (a national program to enhance capacity to conduct research) PREECAN; National Cancer Inst of Canada; \$1,000,000; 2000-2004.
61. Designing a national research agenda in environmental epidemiology of cancer. Medical Research Council of Canada Opportunities Program; \$40,000; 2000-2001.
62. Multi-centric case-control study of cell phone use and cancer risk in Montréal. CIHR; \$500,000; 2000-2004.
63. Trainee award for: Bernard Rachet, Post-doctoral fellow. PREECAN – NCIC; \$46,750; 2001-2003.
64. Cardiogene: a consortium to explore the gene-environment paradigm of major cardiovascular disorders in human and animal models. Canadian Institutes of Health Research, (P.I. P. Hamet) \$2,632,272; 2001-2007.
65. Canada Research Chair in Environmental Epidemiology. Federal CRC program. \$1,400,000; 2001-2008.
66. Installation of CRC. Canadian Foundation for Innovation. \$312,000; 2002-2004.
67. Occupational and lifestyle factors in the etiology of prostate cancer, and establishing a platform for studying susceptibility biomarkers (Part 1). Canadian Cancer Society, Prostate Cancer Research Initiative, National Cancer Institute of Canada, (P.I. M-É Parent) \$947,360; 2002-2007.
68. Center for research on environmental etiology of cancer. For the application process. Centre Hospitalier de l'Université de Montréal (CHUM); \$7,000; 2002-2003.
69. Traffic-related air pollution and socioeconomic gradients in the incidence of cancer. CIHR, (P.I. M Goldberg) \$497,000; 2004-2007.
70. Development and validation of new statistical methods for modeling intermediate events in survival analysis. CIHR, (P.I. M Abrahamowicz) \$68,250; 2004-2005.
71. New survival analytic methods for time-dependent exposures in case-control studies, with applications to cancer. CIHR (P.I. K Leffondré) \$52,791; 2004-2007.
72. Trainee award for: Venkata Ramana Kumar, Post-doctoral fellow. PREECAN – NCIC; \$66,000; 2004-2007.

73. Environmental Cancer Research Team. Development grant for the preparation of the full team grant application. CIHR (P.I. J. Siemiatycki) \$9,500; 2005-2006.
74. Trainee award for: Franco Momoli, PhD student. PREECAN – NCIC; \$25,600; 2005-2006.
75. Occupational and selected non-occupational risk factors for lung cancer: Analysis of a case-control study in Montréal. CIHR (co-P.I.'s: J Siemiatycki & M-É Parent) \$1,920,447; 1999-2011.
76. Development and evaluation of a cost-effective approach for retrospective assessment of occupational exposures in population-based studies (pilot study). Canadian Cancer Etiology Research Network - NCIC (P.I. M-É Parent) \$35,000; 2006-2007.
77. Trainee award for: Aihua Liu, PhD student. PREECAN – NCIC; \$12,600; 2006-2007.
78. Prostate cancer and occupational whole body vibration. Ontario Workplace Insurance Board: Research Advisory Council; Solutions for Workplace Change (P.I. J Purdham); \$140,480; 2006-2008.
79. Guzzo-SRC Chair in Environment and Cancer. Cancer Research Society, \$1,285,000; 2007-2020.
80. INTEROCC: Occupational exposures and brain cancer. NIH (P.I. E Cardis: To support the analysis of the occupational component of an international case-control study involving 13 countries and coordinated at the International Agency for Research on Cancer of the WHO [France]); \$1,626,757 US; 2008-2010.
81. Development and validation of a lung cancer risk prediction model. NCIC (P.I. I Karp); \$102,099; 2008-2010.
82. Occupational and lifestyle factors in the etiology of prostate cancer, and establishing a platform for studying susceptibility biomarkers (Part 2). NCIC (P.I.: M-É Parent); \$756,000; 2008-2011.
83. Preparation and development of an epidemiological study of modifiable and genetic factors associated with ovarian cancer risk (pilot project). Ovarian Cancer Canada (P.I.: A Koushik); \$28,330; 2008-2009.
84. SYNERGY - Pooled analysis of case-control studies on the joint effects of occupational carcinogens in the development of lung cancer: Montréal component. German Statutory Accident Insurance (DGUV) (P.I.: A Koushik); \$119,177; 2008-2010.
85. The risk of lung cancer related to occupational and recreation physical activity and to dietary intake of flavonoids. Canadian Cancer Research Society. (P.I.: A Koushik); \$208,317; 2009-2012.
86. A case-control study of modifiable and genetic factors associated with the risk of ovarian cancer. Canadian Cancer Society Research Institute (P.I: A Koushik); \$498,997; 2010- 2013.
87. Occupational and selected nonoccupational risk factors for lung cancer: analysis of a case-control study in Montréal. CIHR (P.I: J Siemiatycki, M-É Parent); \$850,620; 2011-2015.
88. Quebec Research Program for Prostate Cancer Prevention. Cancer Research Society (P.I.: M-É. Parent, P Karakiewics) \$4,728,203; 2011-2015.
89. Extreme weather and maternal-child health: targeting future impacts of climate change. CIHR. (P.I.: N Auger) \$85,333; 2015-2019.
90. Development of an instrument for assessing occupational exposures in cancer case-control studies and its application to cancers of lung, brain, ovary. Cancer Research Society- Programme GRePEC (Groupe de recherche et de prévention en environnement-cancer). (P.I.: J Siemiatycki, M Pollak) \$2,510,890; 2011-2018.
91. Occupational physical activity and lung cancer. (P.I.: V Ho, A Koushik).CIHR. \$75,000. 2017-2018.
92. Analyses of existing Canadian cohorts and databases related to occupational physical activity and lung cancer risk. CIHR. (P.I.: V Ho, A Koushik) \$74,989; 2017-2018.
93. The role of lifestyle factors in ovarian cancer prognosis. Department of Defence – Ovarian Cancer Research Program. (P.I.: A Koushik) \$216,458 USD (est. \$293, 000 CAD); 2015-2017. Extended August 2018.
94. Occupational Exposure to Endocrine Disrupting Chemicals and Colorectal Cancer risk. CIHR (P.I.: V Ho, J Siemiatycki) \$252,450; 2018-2021.
95. Occupational exposures of women: improvement of an existing job exposure matrix to provide gender-specific estimations of exposure. IRSST. (P.I.: V Ho) \$491,484; 2018-2021.

Exhibit 31

Perineal use of talc and risk of ovarian cancer

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Accepted 15 October 2007

ABSTRACT

Ovarian cancer is one of the most common gynaecological neoplasms, especially in industrialised countries. The aetiology of the disease is not well understood, except that inherited mutations in the breast cancer genes BRCA-1 and BRCA-2 account for up to 10% of all cases,¹ and child-bearing, oral contraceptive use and breast-feeding reduce the risk.² Some environmental exposures, notably talc and asbestos, have been suspected as ovarian carcinogens.

Talc refers to both mineral talc and industrial products that contain mineral talc. Mineral talc occurs naturally in many regions of the world and is valued for its softness, platyness, and ability to absorb organic matter. Mineral talc occurs naturally in a platy (flat) form, but may also occur as asbestiform fibres, which describes its physical form and does not imply the presence of asbestos. The purer forms (approximately 90% mineral talc) are used for cosmetic and hygiene products including baby powders and feminine hygiene products. Perineal use of cosmetic talc is a common practice in the United Kingdom, North America, Australia and some other countries. To our knowledge accurate estimates of prevalence of use of cosmetic talc are not available. However, the use for female hygiene of body powders, baby powders, talcum powders and deodorising powder, most of which contain cosmetic talc in varying amounts, has been reported to be as high as 50% in some countries.³

From pathological studies it is known that particles and fibres that enter the body can migrate to distant organs. For instance, asbestos fibres have been found in ovaries from women exposed to asbestos.^{4,5} Analogously, following perineal application, talc particles can migrate from the vagina to the peritoneal cavity and ovaries.⁶ A majority of women experience retrograde menstruation⁷; this suggests a mechanism by which talc particles can travel through the female reproductive tract to the ovaries. Furthermore, epidemiological studies have shown decreased risks of ovarian cancer after tubal ligation and/or hysterectomy, suggesting that removing a pathway by which carcinogenic substances can reach the ovaries reduces the risk.^{8,9}

The association between talc use in the perineal region and ovarian cancer was investigated in one cohort study,¹⁰ and 20 case-control studies.^{11–30} In the cohort study, arguably the strongest study because of its partly prospective ascertainment of exposure, there was no association between cosmetic talc use and risk of all subtypes of ovarian cancer combined. The various case-control studies provided indications of either a significant excess risk (10 studies) or non-significant excess risk or

null (10 studies), with odds ratios (ORs) ranging from 1.0 to 3.9. None of the studies reported relative risks below 1.0. The population-based case-control studies,^{11 15–17 20–26 28–30} included studies with 112–824 ovarian cancer cases, and had odds ratios ranging from 1.1 to 3.9 (fig 1). The hospital-based case control studies^{12–14 18 19 27} included studies with 77–462 cases, and reported odds ratios between 1.0 and 2.5. Pooled odds ratios were calculated by fixed effects model. As shown in figure 1 pooled ORs were 1.40, 1.12 and 1.35 for population-based, hospital-based and all case control studies combined, respectively. Some studies^{13 14 22 23 26 28} tried to assess exposure-response associations, in terms of frequency of use or length of use in years but found no clear trend.

Methodological factors such as recall bias should always be considered in case-control studies. It could have been a problem had there been widespread publicity about the possible association between use of body powder and cancer. The International Agency for Research on Cancer (IARC) working group considers that there has not been widespread public concern about this issue and therefore considers it unlikely that such a bias could explain the consistent findings. Another source of recall bias could result from the fact that women with the cancer tend to remember or over-report their use of body powder. The influence of this type of recall bias cannot be ruled out.

Eight of the population-based case-control studies^{11 16 22–24 26 28 29} were identified, by the IARC working group as being most informative in terms of size of the studies, whether the studies were population-based, participation rates and adjustments of confounding variables. The selected studies included at least 188 cases and had participation rates ranging from 60% to 75%. Among these eight studies, the prevalence of perineal use of talc-based body powder among controls ranged from 16% to 52%. The relative risks of ovarian cancer among body powder users were homogeneous across this set of eight studies, each of which indicated a 30–60% increase in risk. Among the other 12 case-control studies, most also reported relative risks of this magnitude or higher.

Information on talc use in infancy is generally insufficient in the case-control studies. However, in one study the exposure to baby powder was reported by 42.2% of the cases and 40.5% of the controls.¹⁵ In several of the other studies patients were asked about age at first use of perineal talc, as an indicator for use in infancy or other periods of life.

Only four case-control studies^{16 23 29 30} and one cohort study¹⁰ provided results by histological type. In four of these studies, in particular the cohort study, there were hints of higher risks of serous tumours related to talc exposure.

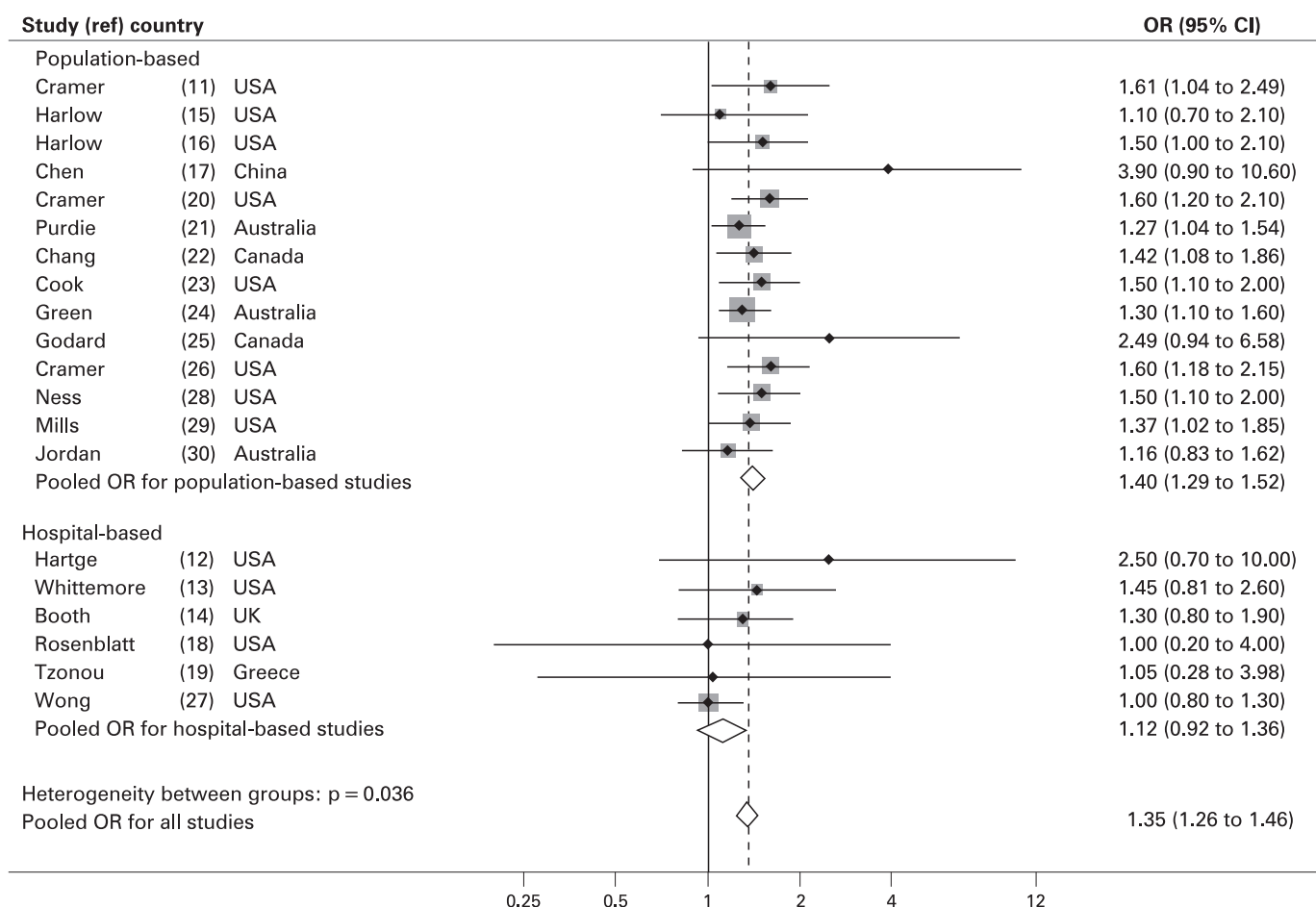


Figure 1 Results from case-control studies contributing data on perineal talc use and ovarian cancer. Results are presented as odds ratios (ORs) and their corresponding confidence intervals (95% CIs) and represented by squares and lines, respectively. Results are separated in 14 population-based and six hospital-based case-control studies. Pooled ORs for all population-based studies combined and all hospital-based studies combined are given. OR pooling by fixed effect models (Mantel-Haenszel method).

Before 1976, talc was to some extent contaminated with asbestos, so that the early studies relating talc to ovarian cancer may have been confounded by the asbestos.³¹ However, the association between talc exposure and ovarian cancer is as strong in recent studies,^{28–29} as in earlier ones, diminishing the likelihood that all these results are influenced by contamination of talc by asbestos.

To summarise the evidence in favour of an association, a very large number of studies have found that women who used talc experienced excess risks of ovarian cancer; some results were statistically significant and some were not. There was some indication in the cohort study of an increase in serous tumours. The evidence of talc migrating to the ovaries lends credibility to such a possible association. The main epidemiological evidence against the association is the absence of clear exposure-response associations in most studies, as well as the absence of an overall excess risk in the cohort study.

On balance, the epidemiological evidence suggests that use of cosmetic talc in the perineal area may be associated with ovarian cancer risk. The mechanism of carcinogenicity may be related to inflammation.³²

The carcinogenicity of non-asbestiform talc was assessed by a monograph working group at IARC in 2006.³³ After considering biases and possible confounding factors, the IARC working group concluded that the epidemiological studies provided

limited evidence for the carcinogenicity of perineal use of talc-based body powder, and classified this use as possibly carcinogenic to human beings (that is, group 2B).³⁴

PROPOSAL: TO RESEARCH COMMUNITY

The current body of experimental and epidemiological evidence is insufficient to establish a causal association between perineal use of talc and ovarian cancer risk. Experimental research is needed to better characterise deposition, retention and clearance of talc to evaluate the ovarian carcinogenicity of talc.

The majority of the epidemiological studies carried out so far have been among American women. It would be instructive to seek evidence in other countries where perineal use of talc has been common.

While there has been some efforts to measure the degree of use, these have mainly been measured simply as the reported years of use. It is possible that the ostensible lack of exposure response trends is the result of crudeness of the exposure metric used. Therefore, it is important that future studies, irrespective of study design, devote some effort to better assessment of exposure. The use of body powders should be assessed both in terms of calendar time and age of the subject. Subjects should be asked about lifetime use, including age at initial use (infancy, childhood, teenager years, adulthood), age at which they stopped using such powders, gaps in the lifetime period of use

What this study adds

- Epidemiological evidence suggests that use of cosmetic talc in the perineal area may be associated with ovarian cancer risk. The IARC has classified this use of talc as possibly carcinogenic to human beings (group 2B).
- The mechanism of carcinogenicity may be related to inflammation. This paper focus on the high degree of consistency in the studies accomplished so far, and what should be the focus in future studies.

and frequency and nature of use (daily, during certain seasons of the year, only while menstruating). Another important question is whether the use of body powder was before or after tubal ligation or hysterectomy.

Individuals' answers to questions about use of brand names over time may be unreliable, and therefore, in future studies, investigators should try to ascertain, either from government or industry sources, the composition of the powders used in different time periods by different brand names and, in particular, to ascertain whether the exposure may have included some contamination by asbestos and also whether the exposure was to talc or a non-talc product. Statistical analyses should attempt to assess risk separately for the categories of powders: talc containing asbestos, talc not containing asbestos, non-talc product. Further, exposure metrics should take into account the age, duration and intensity of exposure. As well as analyses for all ovarian tumours combined, there should, if possible, be analyses by histological subtype and by invasiveness of the tumour.

While it would not be reasonable to envisage establishing a costly long-term prospective cohort study just to study this association, any long-term cohort study that is being set up to study cancer among women should collect information about talc use if the study is being conducted in a country where such use has been widespread.

In summary, future studies should focus on seeking evidence in talc-exposed female populations worldwide, collecting reliable information on age at initial use of body powder, exposure assessments and dose response associations.

Acknowledgements: The work reported in this paper was initiated while SH, JS and EW were part of an IARC Monographs Working Group of the International Agency for Research on Cancer, Lyon, France.

Funding: This study was financed by the Cancer Registry of Norway.

Competing interests: None.

REFERENCES

1. **Lux MP**, Fasching PA, Beckmann MW. Hereditary breast and ovarian cancer: review and future perspectives. *J Mol Med* 2006;**84**:16–28.
2. **Persson I**. Estrogens in the causation of breast, endometrial and ovarian cancers—evidence and hypotheses from epidemiological findings. *J Steroid Biochem Mol Biol* 2000;**74**:357–64.
3. **International Agency for Research on Cancer**. *IARC monographs on the evaluation of carcinogenic risks to human*, Vol 93, Carbon black, titanium dioxide, and non-asbestiform talc. Geneva: WHO (in press).
4. **Heller DS**, Gordon RE, Westhoff C, et al. Asbestos exposure and ovarian fiber burden. *Am J Ind Med* 1996;**29**:435–9.
5. **Langseth H**, Johansen BV, Nesland JM, et al. Asbestos fibers in ovarian tissue from Norwegian pulp and paper workers. *Int J Gynecol Cancer* 2007;**17**:44–9.
6. **Venter PF**. Ovarian epithelial cancer and chemical carcinogenesis. *Gynecol Oncol* 1981;**12**:281–5.
7. **Olive DL**, Schwartz LB. Endometriosis. *N Engl J Med* 1993;**328**:1759–69.
8. **Rosenblatt KA**, Thomas DB. Reduced risk of ovarian cancer in women with a tubal ligation or hysterectomy. the World Health Organization Collaborative Study of Neoplasia and Steroid Contraceptives. *Cancer Epidemiol Biomarkers Prev* 1996;**5**:933–5.
9. **Tortolero-Luna G**, Mitchell MF. The epidemiology of ovarian cancer. *J Cell Biochem Suppl* 1995;**23**:200–7.
10. **Gertig DM**, Hunter DJ, Cramer DW, et al. Prospective study of talc use and ovarian cancer. *J Natl Cancer Inst* 2000;**92**:249–52.
11. **Cramer DW**, Welch WR, Scully RE, et al. Ovarian cancer and talc: a case-control study. *Cancer* 1982;**50**:372–6.
12. **Hartge P**, Hoover R, Leshner LP, et al. Talc and ovarian cancer. *JAMA* 1983;**250**:1844.
13. **Whittemore AS**, Wu ML, Paffenbarger RS Jr, et al. Personal and environmental characteristics related to epithelial ovarian cancer. II. Exposures to talcum powder, tobacco, alcohol, and coffee. *Am J Epidemiol* 1988;**128**:1228–40.
14. **Booth M**, Beral V, Smith P. Risk factors for ovarian cancer: a case-control study. *Br J Cancer* 1989;**60**:592–8.
15. **Harlow BL**, Weiss NS. A case-control study of borderline ovarian tumors: the influence of perineal exposure to talc. *Am J Epidemiol* 1989;**130**:390–4.
16. **Harlow BL**, Cramer DW, Bell DA, et al. Perineal exposure to talc and ovarian cancer risk. *Obstet Gynecol* 1992;**80**:19–26.
17. **Chen Y**, Wu PC, Lang JH, et al. Risk factors for epithelial ovarian cancer in Beijing, China. *Int J Epidemiol* 1992;**21**:23–9.
18. **Rosenblatt KA**, Szklo M, Rosenshein NB. Mineral fiber exposure and the development of ovarian cancer. *Gynecol Oncol* 1992;**45**:20–5.
19. **Tzonou A**, Polychronopoulou A, Hsieh CC, et al. Hair dyes, analgesics, tranquilizers and perineal talc application as risk factors for ovarian cancer. *Int J Cancer* 1993;**55**:408–10.
20. **Cramer DW**, Xu H. Epidemiologic evidence for uterine growth factors in the pathogenesis of ovarian cancer. *Ann Epidemiol* 1995;**5**:310–4.
21. **Purdie D**, Green A, Bain C, et al. Reproductive and other factors and risk of epithelial ovarian cancer: an Australian case-control study. Survey of Women's Health Study Group. *Int J Cancer* 1995;**62**:678–84.
22. **Chang S**, Risch HA. Perineal talc exposure and risk of ovarian carcinoma. *Cancer* 1997;**79**:2396–401.
23. **Cook LS**, Kamb ML, Weiss NS. Perineal powder exposure and the risk of ovarian cancer. *Am J Epidemiol* 1997;**145**:459–65.
24. **Green A**, Purdie D, Bain C, et al. Tubal sterilisation, hysterectomy and decreased risk of ovarian cancer. Survey of Women's Health Study Group. *Int J Cancer* 1997;**71**:948–51.
25. **Godard B**, Foulkes WD, Provencher D, et al. Risk factors for familial and sporadic ovarian cancer among French Canadians: a case-control study. *Am J Obstet Gynecol* 1998;**179**:403–10.
26. **Cramer DW**. Perineal talc exposure and subsequent epithelial ovarian cancer: a case-control study. *Obstet Gynecol* 1999;**94**:160–1.
27. **Wong C**, Hempling RE, Piver MS, et al. Perineal talc exposure and subsequent epithelial ovarian cancer: a case-control study. *Obstet Gynecol* 1999;**93**:372–6.
28. **Ness RB**, Grisso JA, Cotteau C, et al. Factors related to inflammation of the ovarian epithelium and risk of ovarian cancer. *Epidemiology* 2000;**11**:111–7.
29. **Mills PK**, Riordan DG, Cress RD, et al. Perineal talc exposure and epithelial ovarian cancer risk in the Central Valley of California. *Int J Cancer* 2004;**112**:458–64.
30. **Jordan SJ**, Green AC, Whiteman DC, et al. Risk factors for benign serous and mucinous epithelial ovarian tumors. *Obstet Gynecol* 2007;**109**:647–54.
31. **Harlow BL**, Hartge PA. A review of perineal talc exposure and risk of ovarian cancer. *Regul Toxicol Pharmacol* 1995;**21**:254–60.
32. **Ness RB**, Cotteau C. Possible role of ovarian epithelial inflammation in ovarian cancer. *J Natl Cancer Inst* 1999;**91**:1459–67.
33. **International Agency for Research on Cancer**. *Preamble to the IARC monographs on the evaluation of carcinogenic risks to humans*. 93. Lyon: IARC
34. **Baan R**, Straif K, Grosse Y, et al. Carcinogenicity of carbon black, titanium dioxide, and talc. *Lancet Oncol* 2006;**7**:295–6.

Exhibit 32

Jack Siemiatycki, Ph.D.

Page 1

UNITED STATES DISTRICT COURT
DISTRICT OF NEW JERSEY

-----x

IN RE JOHNSON & JOHNSON) MDL No.
TALCUM POWDER PRODUCTS) 16-2738 (FLW)(LHG)
MARKETING SALES PRACTICES,)
AND PRODUCTS LIABILITY)
LITIGATION)
)
THIS DOCUMENT RELATES TO)
ALL CASES)

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VIDEOTAPED DEPOSITION OF

JACK SIEMIATYCKI, Ph.D.

MONTREAL, CANADA

THURSDAY, JANUARY 31, 2019

9:49 A.M.

Reported by: Leslie A. Todd

Jack Siemiatycki, Ph.D.

<p style="text-align: right;">Page 2</p> <p>1 Deposition of JACK SIEMIATYCKI, Ph.D., held at 2 the offices of: 3 4 5 CHUM Research Center 6 Montreal, Canada 7 8 9 10 11 12 Pursuant to notice, before Leslie Anne Todd, 13 Court Reporter and Notary Public in and for the 14 District of Columbia, who officiated in 15 administering the oath to the witness. 16 17 18 19 20 21 22 23 24 25</p>	<p style="text-align: right;">Page 4</p> <p>1 APPEARANCES (Continued): 2 3 RICHARD GOLOMB, ESQUIRE 4 GOLOMB & HONIK, LLP 5 1835 Market Street 6 Suite 2900 7 Philadelphia, Pennsylvania 19103 8 (215) 278-4449 9 rgolomb@golombhonik.com 10 ON BEHALF OF THE JOHNSON & JOHNSON DEFENDANTS: 11 KIMBERLY OLVEY BRANSCOME, ESQUIRE 12 KIRKLAND & ELLIS LLP 13 333 South Hope Street 14 Los Angeles, California 90071 15 (213) 680-8370 16 kimberly.branscome@kirkland.com 17 JESSICA BRENNAN, ESQUIRE 18 DRINKER BIDDLE & REATH LLP 19 600 Campus Drive 20 Florham Park, New Jersey 07932 21 (973) 540-1000 22 jessica.brennan@dbr.com 23 24 25</p>
<p style="text-align: right;">Page 3</p> <p>1 A P P E A R A N C E S 2 3 ON BEHALF OF THE PLAINTIFFS: 4 CHRISTOPHER V. TISI, ESQUIRE 5 LEVIN PAPANTONIO, LLP 6 316 South Baylen Street 7 Pensacola, Florida 32502 8 (850) 435-7184 9 ctisi@levinlaw.com 10 MICHELLE A. PARFITT, ESQUIRE 11 ASHCRAFT & GEREL, LLP 12 4900 Seminary Road, Suite 650 13 Alexandria, Virginia 22311 14 (703) 997-1774 15 MParfitt@ashcraftlaw.com 16 ALASTAIR J.M. FINDEIS, ESQUIRE 17 NAPOLI SHKOLNIK, PLLC 18 360 Lexington Avenue 19 11th Floor 20 New York, New York 10017 21 (212) 397-1000 22 23 24 25</p>	<p style="text-align: right;">Page 5</p> <p>1 APPEARANCES (Continued): 2 3 ON BEHALF OF THE PCPC: 4 RENEE APPEL, ESQUIRE (Telephonically) 5 SEYFARTH SHAW LLP 6 975 F Street, N.W. 7 Washington, DC 20004 8 (202) 828-5371 9 rappel@seyfarth.com 10 ON BEHALF OF THE IMERY'S DEFENDANTS: 11 MICHAEL R. KLATT, ESQUIRE 12 GORDON & REES SCULLY MANSUKHANI, LLP 13 816 Congress Avenue, Suite 1510 14 Austin, Texas 78701 15 (512) 391-0183 16 mklatt@grsm.com 17 ON BEHALF OF PTI: 18 CAROLINE M. TINSLEY, ESQUIRE (for PTI) 19 TUCKER ELLIS, LLP 20 100 South 4th Street, Suite 600 21 St. Louis, Missouri 63102 22 (314) 571-4965 23 caroline.tinsley@tuckerellis.com 24 ALSO PRESENT: 25 FABIO DEFELICE (Videographer)</p>

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Jack Siemiatycki, Ph.D.

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1	CONTENTS	1	EXHIBITS (Continued)
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5	By Ms. Parfitt 290	5	Risk Factors For Cancer in the
6		6	Workplace by Dr. Jack Siemiatycki
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9	SIEMIATYCKI DEPOSITION EXHIBITS PAGE	9	Confounding Bias Related to
10	No. 1 Notice of Oral and Videotaped	10	Smoking, Ethnic Group, and
11	Deposition of Jack Siemiatycki	11	Socioeconomic Status in Estimates
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13	No. 2 Plaintiffs' Steering Committee's	13	Occupation and Cancer," Journal of
14	Response and Objections to the	14	Occupation Medicine/Volume 30
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1	EXHIBITS (Continued)	1	PROCEEDINGS
2	(Attached to transcript)	2	-----
3	SIEMIATYCKI DEPOSITION EXHIBITS PAGE	3	THE VIDEOGRAPHER: Good morning. We're
4	No. 7 JS EpiTech Inc. bill for	4	now on the record. My name is Fabio DeFelice.
5	Professional Services, August 9 -	5	I'm the videographer for Golkow Litigation
6	November 16, 2018 46	6	Services. Today's date is January 31st of 2019.
7	No. 8 JS EpiTech Inc. bill for	7	The time is 9:49 a.m.
8	Professional Services, July 1 -	8	This video deposition is being held at
9	August 2, 2018 48	9	the CHUM Research Center in Montreal, Canada, in
10	No. 9 Report of Jack Siemiatycki dated	10	the matter In Re: Johnson & Johnson Talcum Powder
11	October 4th, 2016 (not attached) 58	11	Products in the United States District Court for
12	No. 10 Expert Report of Jack Siemiatycki	12	the Eastern District of New Jersey. The case
13	Msc, PhDn Talcum Powder Use and	13	number is 16-2738.
14	Ovarian Cancer (not attached) 61	14	The deponent is Jack Siemiatycki, Ph.D.
15	No. 11 Expert Report of Jack Siemiatycki	15	The counsel will be noted on the
16	MSc, PhD on Talcum Powder Use and	16	stenographic record. The court reporter is Leslie
17	Ovarian Cancer (with handwritten	17	Todd, and will now swear in the witness.
18	notations) 110	18	JACK SIEMIATYCKI, Ph.D.,
19	No. 12 Berge 2012 report (not attached) 194	19	and having been first duly sworn,
20	No. 13 Schildkraut report (not attached) 214	20	was examined and testified as follows:
21	No. 14 Anita Koushik information from	21	DIRECT EXAMINATION
22	Environepi website 278	22	BY MS. BRANSCOME:
23	No. 15 Pages from Environepi website	23	Q Good morning, Dr. Siemiatycki.
24	discussing Group Research Topics 285	24	A Good morning. Nice to meet you.
25		25	Q We met just before the deposition

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Jack Siemiatycki, Ph.D.

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<p>1 started, but my name is Kimberly Branscome, and I 2 am here to ask you questions today on behalf of 3 Johnson & Johnson. 4 Is that all right? 5 A Thank you. Yes. 6 Q All right. We are taking your 7 deposition today in the case of In Re: Johnson & 8 Johnson Talc Litigation, MDL. 9 Is it your understanding that you have 10 been designated as a testifying expert in that 11 case? 12 A Yes. 13 Q When were you first contacted about 14 serving as an expert witness in the MDL 15 litigation? 16 A I believe it was in the spring or summer 17 of 2018, but I'm not positive about that. 18 Q Who contacted you? 19 A Ms. Parfitt. 20 Q Have you communicated with any other 21 lawyers regarding your work on the talc MDL? 22 A I've had a couple of meetings with 23 Ms. Parfitt and her colleagues that she works 24 with. 25 Q Can you identify the individuals with</p>	<p>1 anyone else present at those meetings? 2 A No. 3 Q You didn't have anyone from your team, 4 for example, present? 5 A No. 6 MS. PARFITT: Objection. Form. 7 BY MS. BRANSCOME: 8 Q What did you do to prepare for your 9 deposition today? 10 A Do you mean from the beginning of my 11 involvement in the MDL case back last summer or do 12 you mean just in the last few days? 13 Q Let's take it more broadly. 14 What have you done to develop your 15 opinions in this case, and then specifically to 16 prepare for your deposition? 17 A I reviewed -- I rereviewed the 18 literature about talc and ovarian cancer, 19 scientific literature. I evaluated it, I wrote a 20 report about it. And in the last few days, I went 21 over all of the -- not all, but a lot of the 22 material that I had gone through initially and 23 just clarified for myself, looked for any issues 24 that I had missed the first time around, things 25 like that.</p>
Page 11	Page 13
<p>1 whom you have met in addition to Ms. Parfitt? 2 A Yes, there are two, and they are here 3 present. Chris Tisi and Alastair -- 4 MR. FINDEIS: Findeis. 5 THE WITNESS: Say that again. 6 MS. PARFITT: Findeis. 7 THE WITNESS: And that's -- thank you. 8 BY MS. BRANSCOME: 9 Q How many meetings have you had to 10 prepare for your expert opinions in the MDL? 11 A One yesterday and one about a month -- 12 about three weeks ago. 13 Q Where did those meetings take place? 14 A Here. 15 Q And by "here," do you mean in Montreal? 16 A In Montreal, yes. 17 Q How long did each meeting last? 18 A Yesterday's was about four, five hours 19 maybe. Four or five hours. And the earlier one, 20 I guess all told, about ten hours maybe. 21 Q Did the ten-hour meeting take place over 22 one day? 23 A Over two days. 24 Q In addition to the attorneys that you 25 just identified for the record and yourself, was</p>	<p>1 Q As part of your review of materials in 2 preparation for today, did you identify anything 3 in your review that changed the opinions that you 4 have offered in the expert report in the MDL? 5 A No. Those opinions remain valid. 6 Q When you say that you rereviewed the 7 scientific literature in preparation for the 8 development of your opinions in the MDL, what did 9 you mean by "rereviewed"? 10 A Well, I had reviewed -- I've reviewed 11 evidence around talc and ovarian cancer on a few 12 different occasions. The first time was in 2006 13 when I was on an international review committee on 14 the topic. Then in 2015, '16, '17, in preparation 15 for another litigation regarding talc and ovarian 16 cancer. Then in the summer/fall of 2018, in 17 preparation for writing a report that was 18 submitted for this case. And then in the last 19 week or two, roughly speaking, I went over all of 20 that. So I refer to that as a rereview. 21 Q Have you ever discussed your deposition 22 with any of -- of the other experts designated by 23 the plaintiffs in the MDL? 24 A No, I haven't. 25 Q Have you discussed your expert opinions</p>

4 (Pages 10 to 13)

Jack Siemiatycki, Ph.D.

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<p>1 with any of the other experts designated by the 2 plaintiffs in the MDL? 3 A No, I haven't. 4 Q Are you aware of the list of experts 5 that have been designated by the plaintiffs in the 6 MDL? 7 A I'm aware of at least some of them. I'm 8 not sure if I'm aware of all of them, but I'm 9 aware of some of them. 10 Q Who specifically are you aware of? 11 A Singh, McTiernan, Laura Plunkett. And 12 there are a few more, and I could look it up. 13 Q I'd like to start by just marking the 14 deposition notice for your deposition as 15 Exhibit 1. 16 Dr. Siemiatycki, you will see two large 17 binders over there in front of you. This will be 18 tab 1. 19 So I'd like -- 20 A I see it. 21 Q I'd like to mark for identification 22 the document behind tab 1, which is 23 Dr. Siemiatycki's deposition notice as Exhibit 1 24 to this deposition. 25 MS. PARFITT: Do you want to give me --</p>	<p>1 your deposition that were submitted by plaintiffs' 2 counsel in the MDL. And this one we actually will 3 need to mark a copy, because it's not in your 4 binder. 5 (Exhibit No. 2 was marked for 6 identification.) 7 MS. BRANSCOME: Do you have an extra 8 copy, Michelle? 9 MS. PARFITT: I do. Not a worry. I got 10 it. 11 BY MS. BRANSCOME: 12 Q Dr. Siemiatycki, have you ever seen the 13 document that has been marked as Exhibit 2, which 14 is the plaintiffs' general objections to your 15 deposition notice? 16 A I'm not sure. 17 MS. PARFITT: I will represent for the 18 record that's not been provided to 19 Dr. Siemiatycki. 20 BY MS. BRANSCOME: 21 Q All right. So if you could, 22 Dr. Siemiatycki, did you bring any materials with 23 you today to the deposition? 24 A Yes, I brought a lot of documents, just 25 in case.</p>
Page 15	Page 17
<p>1 Do you want me to just mark them? Will 2 that help you, instead of reaching across the 3 table? It's up to you. I can put the stickers on 4 it. 5 (A discussion was held off the record.) 6 (Exhibit No. 1 was marked for 7 identification.) 8 BY MS. BRANSCOME: 9 Q Dr. Siemiatycki, are you familiar with 10 the document that we have just marked as 11 deposition Exhibit 1? 12 A I've seen something like this. I'm -- 13 not reading through it, I'm not sure if it's 14 exactly the same document that I have seen before, 15 but I guess this is kind of the standard format of 16 notice that is sent to experts ahead of time. So 17 I've seen -- I've seen that. 18 Q Do you understand that what has been 19 marked as Exhibit 1, which is the notice for your 20 deposition, requests that you bring certain 21 documents with you to this deposition? 22 A Yes. 23 Q All right. And just for completeness 24 and at the request of plaintiffs' counsel, I will 25 also mark as Exhibit 2 the general objections to</p>	<p>1 Q Can you identify for me, and we can 2 start with a general category first, if that's 3 helpful, the materials that you brought with you 4 today to your deposition? 5 A Well, I brought my report. I brought an 6 addendum to my report, which I think has been 7 provided to you. 8 MS. PARFITT: Yes, that was the table. 9 THE WITNESS: It's a long -- it's a set 10 of -- 11 MS. PARFITT: I have a copy of that if 12 you wish to have it marked. Do you want it -- if 13 you give me a number, I will put it on this one. 14 BY MS. BRANSCOME: 15 Q Let's see. Yeah, let's go ahead and 16 mark the addendum to your expert report as 17 Exhibit 3. 18 (Exhibit No. 3 was marked for 19 identification.) 20 BY MS. BRANSCOME: 21 Q Dr. Siemiatycki, could you just confirm 22 for the record that what we have marked as 23 Exhibit 3 is in fact the complete addendum to your 24 MDL expert report? 25 A I -- I believe it is. I believe it is.</p>

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<p style="text-align: right;">Page 18</p> <p>1 Q What else did you bring with you today?</p> <p>2 A I'm not sure if this is the right time</p> <p>3 to mention it, but there were a couple of -- in</p> <p>4 the past few days I picked up a couple of typos in</p> <p>5 my report, and I've hand scribbled them on my</p> <p>6 copy, and I can tell you about those very quickly,</p> <p>7 but I'm not sure if this is now the right time for</p> <p>8 this or later.</p> <p>9 Q I will ask you about any corrections</p> <p>10 that you have, but it is good to know that the</p> <p>11 report you brought with you has some handwriting</p> <p>12 on it, so we will make sure to mark that copy.</p> <p>13 A Okay.</p> <p>14 Q What else did you bring with you today?</p> <p>15 A I brought -- well, I brought three</p> <p>16 binders of material that were part of the -- the</p> <p>17 references to my report.</p> <p>18 MS. PARFITT: And if I may, I provided</p> <p>19 counsel in advance of the deposition a thumb drive</p> <p>20 that contains all of Dr. Siemiatycki's report but</p> <p>21 also the references related to that report.</p> <p>22 THE WITNESS: I brought a couple of</p> <p>23 binders -- well, more than a couple. It looks</p> <p>24 like five binders of different documents that I</p> <p>25 thought might be useful in answering questions</p>	<p style="text-align: right;">Page 20</p> <p>1 Agency for Research on Cancer, of the meeting held</p> <p>2 in Lyon in 2006. The book was published in 2010,</p> <p>3 and it contains an evaluation of talc</p> <p>4 carcinogenicity as of 2006.</p> <p>5 The next one is a textbook of</p> <p>6 epidemiology that is probably considered the most</p> <p>7 respected one in the field at this point, authored</p> <p>8 by Rothman, T -- R-O-T-H-M-A-N, Greenland,</p> <p>9 G-R-E-E-N-L-A-N-D, and Lash, L-A-S-H.</p> <p>10 MR. KLATT: Dr. Siemiatycki, is there a</p> <p>11 particular edition or is there --</p> <p>12 THE WITNESS: Oh, yeah. Yeah, this one</p> <p>13 is third edition. Thank you.</p> <p>14 The fourth one is kind of a handbook</p> <p>15 called Dictionary of Epidemiology, edited by</p> <p>16 Porta, P-O-R-T-A, which is kind of a very basic</p> <p>17 book of definitions.</p> <p>18 And the fifth one is called An</p> <p>19 Introduction to Meta-Analysis. The first author</p> <p>20 is Borenstein, B-O-R-E-N-S-T-E-I-N.</p> <p>21 BY MS. BRANSCOME:</p> <p>22 Q All right. Focusing first on the books</p> <p>23 that you brought with you, why did you bring with</p> <p>24 you a book about Risk Factors --</p> <p>25 A For cancer.</p>
<p style="text-align: right;">Page 19</p> <p>1 that you might ask. So it was -- I was just</p> <p>2 speculating on the types of questions you might</p> <p>3 ask and brought documents that might help to</p> <p>4 answer or to support arguments or statements that</p> <p>5 I would make. I brought five --</p> <p>6 MS. PARFITT: You can get --</p> <p>7 THE WITNESS: -- which --</p> <p>8 MS. PARFITT: -- the texts --</p> <p>9 THE WITNESS: The textbooks. I brought</p> <p>10 five books with me, again in the same spirit that</p> <p>11 things might come up that it would be helpful to</p> <p>12 refer to material in these books. One -- should I</p> <p>13 tell you what they are?</p> <p>14 BY MS. BRANSCOME:</p> <p>15 Q If you would, please, identify each of</p> <p>16 the books --</p> <p>17 A Okay.</p> <p>18 Q -- for the record, and we will return to</p> <p>19 the eight binders that you just mentioned.</p> <p>20 A One is a book called Risk Factors for</p> <p>21 Cancer in the Workplace. And it's a book that I</p> <p>22 wrote 30 years ago about occupational causes of</p> <p>23 cancer.</p> <p>24 The other one -- the next one is the</p> <p>25 monograph of IARC, which is the International</p>	<p style="text-align: right;">Page 21</p> <p>1 Q -- for Cancer in the Workplace?</p> <p>2 A Because it has -- in that book I -- I</p> <p>3 described my research. I described the research</p> <p>4 findings from my projects in this area. I also</p> <p>5 described the process of conducting epidemiologic</p> <p>6 research and drawing inferences from epidemiologic</p> <p>7 data, and how -- what are the considerations that</p> <p>8 would be used in drawing inferences from</p> <p>9 epidemiologic data for cancer causation. And I</p> <p>10 thought this might come up during the day.</p> <p>11 Q Do the methodological principles that</p> <p>12 you outline in your book, Risk Factors for Cancer</p> <p>13 in the Workplace, are those still current in your</p> <p>14 view today?</p> <p>15 A Yes.</p> <p>16 Q And why specifically did you want to</p> <p>17 have this book available to you during your</p> <p>18 deposition?</p> <p>19 A In case any of the statements that I've</p> <p>20 made in my report about evaluating causation and</p> <p>21 how epidemiology is used for evaluating causation</p> <p>22 are challenged. And specifically, I was</p> <p>23 anticipating that there may be challenges to the</p> <p>24 fact that my approach to this question might be</p> <p>25 new and just sort of concocted in the context of</p>

6 (Pages 18 to 21)

Jack Siemiatycki, Ph.D.

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<p>1 the litigation, and I wanted to show that in my 2 own sort of intellectual history, these ideas have 3 been there forever but certainly for the last 30 4 years, and that these are commonly held views. 5 Q Are there specific chapters within the 6 book that you brought with you that you would 7 direct someone to to gain information about the 8 methodology that you applied in the MDL? 9 MS. PARFITT: Objection. Form. 10 THE WITNESS: I'm sorry. Could you 11 repeat the question? 12 BY MS. BRANSCOME: 13 Q Understanding that what you brought with 14 you -- 15 A Yes. 16 Q -- is a complete book -- 17 A Yes. 18 Q -- are there specific chapters that you 19 contend contain an explanation of the methodology 20 that is similar to what you have applied in your 21 analysis in the MDL? 22 MS. PARFITT: Objection. Form, broad. 23 THE WITNESS: So I would say there are 24 two chapters that have relevance to the issue at 25 hand. The last chapter contains a discussion of</p>	<p>1 A Yeah. 2 Q -- in the MDL? 3 A I -- yes, I -- I collected as much 4 information, data from different research studies 5 as possible. I evaluated those studies. I 6 ordered them according to the types of evidence 7 that they provide. I tried to synthesize the 8 evidence in particular in the basket of 9 epidemiologic research on the topic. And I 10 juxtaposed the information from epidemiologic 11 evidence with evidence derived from other domains 12 which are provided by other experts. And I made a 13 professional judgment about how all of that fits 14 with different ways of understanding the 15 relationship between perennial use of talc and the 16 risk of ovarian cancer. 17 Q Is the methodology that you just 18 described that you used in forming your opinions 19 in the MDL described in the textbook that you 20 brought with you about risk factors in the 21 workplace? 22 A It is implicit. It is implicit in the 23 work of epidemiologists, and it's implicit in the 24 way we synthesize information. So, in 25 epidemiologic practice, the role of -- there's no</p>
Page 23	Page 25
<p>1 causality and how to use epidemiology in the 2 process of determining causality. 3 The first -- the second chapter contains 4 information -- excuse me, I think it's the second 5 chapter -- contains information about different 6 epidemiologic research designs, and it's a 7 discussion of case-controlled studies, cohort 8 studies, and other types of epidemiologic designs 9 and their relative advantages and disadvantages. 10 BY MS. BRANSCOME: 11 Q Is there a description of the 12 methodology that you have applied in your analysis 13 in the MDL that is directly described in the book 14 that you just referenced? 15 MS. PARFITT: Objection. Form. 16 THE WITNESS: I'm not sure what you mean 17 by "directly," and I'm not sure what you mean by 18 "methodology." 19 BY MS. BRANSCOME: 20 Q Did you apply a specific methodology in 21 reaching your opinions here in the MDL? 22 A What do you mean by "a specific 23 methodology"? 24 Q Did you -- did you use a methodology in 25 forming your opinions --</p>	<p>1 cookbook recipe in how you start the day and 2 finish the day. You collect data. You use your 3 best judgment about how to synthesize and 4 integrate it. And I guess it comes under the 5 rubric of weight of evidence. You look at all of 6 the evidence, and you (weigh it according to your 7 professional judgment. 8 And most of the agencies that have any 9 policies or statements about synthesizing 10 information will talk about collecting 11 information, evaluating it, weighing it, and 12 making a judgment about it. 13 Q If someone were reviewing just your 14 report in the MDL, would they be able to replicate 15 the weight that you gave different pieces of 16 evidence that you considered? 17 A The synthesis of scientific information 18 is not an automated process. It can't be done by 19 a robot. And in every description of how such 20 evidence is synthesized and integrated, the final 21 step always involves professional judgment, and as 22 it should, because there are too many moving parts 23 in all of this to be able to, a priori, set up an 24 algorithm that allows you to automate and arrive 25 at some score that tells you, yes or no, this</p>

7 (Pages 22 to 25)

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<p>1 agent is dangerous or not dangerous or something 2 like that. 3 So in line with everything I've done in 4 my career, everything that I've been involved with 5 in international and national agencies, whether 6 it's USNCI or the World Health Organization or 7 other agencies, the process depends critically on 8 judgment of the people who are making the 9 decisions or who are making the evaluations. 10 Q Respectfully, Dr. Siemiatycki, that was 11 not my question. 12 My question was, could someone by 13 reviewing the report that you have provided in the 14 MDL replicate your analysis in the sense that they 15 would understand the weight that you gave to each 16 piece of evidence you considered? 17 A I think to a considerable extent I've 18 given fairly explicit information in the report on 19 all of the components of information that I used 20 and the relative weight, but -- not in a 21 quantitative way, but the relative importance that 22 I attribute to different parts of the evidence 23 package. 24 Q You did not do any type of scoring 25 system, for example, in considering the various</p>	<p>1 selected, when they were selected, when they were 2 followed up, how -- all of these things may have a 3 different score, and you may have a hundred 4 dimensions to evaluate on each study. And nobody 5 has come up with a -- a usable, useful, 6 replicatable method for integrating all of this. 7 There have been some attempts and there are some 8 scoring systems out there. The fact that there 9 are scoring -- that someone has published a 10 scoring system, and that even a committee has, 11 does not mean that it's valid. 12 But I -- my professional opinion, and 13 that of I think many other people -- because 14 typically studies are not scored in this way. 15 That's -- when people review evidence. Or if 16 they -- anyway, typically they are not, and my 17 feeling is that there is no valid way really of 18 doing it. 19 But the -- in order to sort of complete 20 the answer to I think what's behind your question 21 of why I didn't do such a thing in my report with 22 all of the studies is that I adopted early on -- I 23 made a decision early on to avoid excluding 24 studies from my analysis based on my opinion about 25 the quality of the study. This is a decision that</p>
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<p>1 underlying studies that you evaluated. Is that 2 fair? 3 A No -- no, I did not, because I don't 4 consider that a valid procedure. 5 Q Why is that not a valid procedure? 6 A Because I don't think epidemiologic 7 studies can be summarized in single-digit scores. 8 There are too many different aspects of a study, 9 and any attempt to do so, I think is flawed and -- 10 Q Why is the attempt to assigning a score, 11 single digit or otherwise, a flawed methodology? 12 A Because there are so many -- a study can 13 be good in one dimension, mediocre in a third, 14 excellent in a fourth, bad in a fifth, so-so in a 15 sixth, and so on. 16 There are so many dimensions of a study, 17 and each one of them can be rated. And that's -- 18 that is something that I do do. I evaluate 19 everything from participation rate to the 20 population in which the study was carried out, to 21 the way the questions were asked in the 22 questionnaire, to the way the information from the 23 questionnaire was -- was coded and categorized, to 24 the way the design of the -- whether its case 25 controlled or otherwise, how the subjects were</p>	<p>1 other meta-analyses have also made implicitly. I 2 don't know if they've made it explicitly, but 3 there are no studies that have -- as far as I 4 know, there are no meta-analyses that have 5 literally excluded studies on the basis of quality 6 or -- or done a systematic attempt to do this. 7 And I made a decision early on that if I 8 tried to -- if I went down the road of eliminating 9 some studies from my analysis, this would be 10 criticized as some form of cherry-picking, and in 11 an attempt to avoid that criticism, I decided I 12 would include all pieces of evidence, 13 notwithstanding my opinion of the overall quality 14 of the study. 15 Q Okay. Dr. Siemiatycki, that was a very 16 long answer, but I will try to unpack a few -- 17 A Yes. 18 Q -- portions of that. 19 So you would agree that in order for a 20 methodology to be valid, it has to be a process 21 that can be replicated? 22 MS. PARFITT: Objection. Form. 23 THE WITNESS: What do you mean by 24 "replicated"? You mean that someone else 25 following exactly the same steps and the -- making</p>

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<p>1 the same assumptions as the -- the person who did 2 the analysis would be able to end up with the same 3 statistical estimates at the end? Is that what 4 you mean? Or do you mean that they would make the 5 same judgments? 6 BY MS. BRANSCOME: 7 Q Well, Dr. Siemiatycki, you indicated one 8 of the reasons why you don't agree with using a 9 quantitative point system was that a methodology 10 had not been developed that was, I believe you 11 said, useful, usable and replicable. 12 What did you mean by the word 13 "replicable" when you used it in your own answer? 14 A Did I use the word "replicable" in that 15 sentence? Can I -- can I read that? (Peruses 16 monitor.) 17 I'm not sure what I had in mind with the 18 use -- the word -- yes, you can produce a 19 replicable system, but it doesn't mean that it's 20 valid. So useful and usable, yes. I don't think 21 that there is one that would capture, for 22 observational epidemiology, the -- all of the 23 components that are necessary really to tease out 24 good and/or bad studies. 25 BY MS. BRANSCOME:</p>	<p>1 giving to the pieces of evidence that he or she is 2 considering in reaching their ultimate conclusion. 3 Is that fair? 4 MS. PARFITT: Objection. Form. 5 THE WITNESS: It depends what you mean 6 by "weight." If you mean by "weight" a 7 quantitative number, then, no, that's not 8 necessary. 9 If you mean sort of a heuristic, 10 qualitative understanding of the relative 11 importance of different components of evidence, 12 then I would say yes. It's important to know what 13 played into a -- a reviewer's opinion. 14 BY MS. BRANSCOME: 15 Q You also indicated that you do in fact 16 rate studies. What did you mean by that? 17 A Sorry. Can we read back where I said 18 that? I -- (peruses monitor.) 19 I haven't found it, but I -- I think I 20 meant it as a synonym for evaluate. I think I 21 meant I evaluate different studies. 22 Q Okay. If I could direct your 23 attention -- 24 A Yes. 25 Q -- to pages -- page 19, lines 6</p>
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<p>1 Q My question to you, though, 2 Dr. Siemiatycki, is that, is it important for a 3 methodology to be replicable? 4 A It is important -- the most important is 5 for it to be valid. The replicability is an issue 6 that involves judgment. Different scientists may 7 have different judgments about the value of 8 different components of evidence. That diversity 9 of judgment is not a bad thing, and there's no 10 benefit to science in forcing everyone to have the 11 same judgment within some scoring system. 12 So science progresses from collection of 13 data and from different scientists evaluating the 14 data, and from the same information base different 15 scientists can make different judgments about it, 16 and in that sense, the final evaluations are not 17 necessarily replicable because different 18 scientists can make different judgments. 19 But they are understandable. You need 20 the different processes to be sufficiently 21 understandable that different readers and so on of 22 reports can understand how you came to the 23 conclusions. 24 Q And so it is important to be able to 25 understand what weight a particular scientist is</p>	<p>1 through 8. 2 A Of -- 19 of -- of what? 3 Q Of the transcript that's -- 4 A Okay. 5 Q -- in front of you, which understanding 6 is just a rough, but if you want to review your 7 answer. 8 A Sure. (Peruses document.) 9 Yes, here by "rated," I meant evaluated. 10 Q Did you rank the different pieces of 11 evidence that you considered in forming your 12 opinion with respect to talc and the risk of 13 ovarian cancer? 14 A I -- I've never done that in the 15 hundreds and hundreds of evaluations I've carried 16 out, nor in this one do I actually put a score on 17 different components of -- of a study. Yeah. 18 Q My question is slightly different, 19 Dr. Siemiatycki. 20 It's ranking them relative to each 21 other. So whether or not you're assigning a 22 specific quantitative number to the study, do you 23 evaluate this is, for instance, the most important 24 study and this is the least important study on a 25 particular topic?</p>

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<p style="text-align: right;">Page 34</p> <p>1 MS. PARFITT: Objection. Form.</p> <p>2 THE WITNESS: You mean overall or in --</p> <p>3 in each dimension that the -- that a study is</p> <p>4 comprised of?</p> <p>5 BY MS. BRANSCOME:</p> <p>6 Q Did you do any type of ranking of that</p> <p>7 nature, be it in a subtopic or overall?</p> <p>8 A Not -- not explicitly, no.</p> <p>9 Q You mentioned at the -- at the end of</p> <p>10 your answer that you made a decision not to</p> <p>11 exclude studies because you would not want to face</p> <p>12 the criticism of cherry-picking; is that correct?</p> <p>13 A Yes, I said that.</p> <p>14 Q What is your understanding of the</p> <p>15 criticism of cherry-picking?</p> <p>16 A My understanding is that one would --</p> <p>17 one might look at a body of evidence, have a</p> <p>18 preconceived notion about the topic, the</p> <p>19 hypothesis under consideration, and use those</p> <p>20 studies that support that hypothesis and discard</p> <p>21 the other ones in some way.</p> <p>22 Q Is that good science, in your opinion?</p> <p>23 A No, that's not good science.</p> <p>24 Q Why not?</p> <p>25 A Because it doesn't produce an objective</p>	<p style="text-align: right;">Page 36</p> <p>1 conclusion.</p> <p>2 BY MS. BRANSCOME:</p> <p>3 Q When I asked you the question of whether</p> <p>4 or not the methodology you applied here in forming</p> <p>5 your opinion in the MDL is contained in the book</p> <p>6 that you wrote about Risk Factors for Cancer in</p> <p>7 the Workplace, you said it was implicit.</p> <p>8 Is that methodology explicitly described</p> <p>9 in that textbook or any of the other textbooks you</p> <p>10 brought with you today?</p> <p>11 A I'm not sure that the methodology -- you</p> <p>12 know, I think it -- the collection of data, the</p> <p>13 evaluation of data, the judgment about the</p> <p>14 collection of data is a part of the scientific</p> <p>15 method, and it is so engrained and implicit in</p> <p>16 epidemiology and in other sciences that you don't</p> <p>17 really need to -- and scientists don't write in</p> <p>18 their books or in their -- unless they're talking</p> <p>19 to first-year students -- talk about this. It's</p> <p>20 so elementary that those aspects are not really</p> <p>21 described. One goes further in describing</p> <p>22 specific methodologies that would pertain to the</p> <p>23 topic under consideration.</p> <p>24 Q Are there different ways to perform a</p> <p>25 meta-analysis?</p>
<p style="text-align: right;">Page 35</p> <p>1 portrait of reality.</p> <p>2 Q If a scientist were to selectively</p> <p>3 identify studies that were supportive of his or</p> <p>4 her preconceived notion, would you consider that</p> <p>5 analysis to be a valid one?</p> <p>6 MS. PARFITT: Objection. Form.</p> <p>7 THE WITNESS: Do you mean -- just -- I'm</p> <p>8 just trying to parse your question. You said if a</p> <p>9 scientist were to identify studies that were</p> <p>10 supportive, et cetera, but also that were in</p> <p>11 opposition or to exclude ones that are in</p> <p>12 opposition?</p> <p>13 BY MS. BRANSCOME:</p> <p>14 Q Fair enough.</p> <p>15 So referring back to the scenario that</p> <p>16 you have described as cherry- picking --</p> <p>17 A Yes.</p> <p>18 Q -- if a scientist were to engage in</p> <p>19 cherry-picking, would you consider the ultimate</p> <p>20 conclusion that that scientist reached with</p> <p>21 respect to causation or increased risk of an agent</p> <p>22 to be a valid one?</p> <p>23 A It should be suspect --</p> <p>24 MS. PARFITT: Objection. Form.</p> <p>25 THE WITNESS: It would be a suspect</p>	<p style="text-align: right;">Page 37</p> <p>1 A Yes.</p> <p>2 Q Okay. Did the method that you chose in</p> <p>3 developing your meta-analysis, is that explicitly</p> <p>4 described in any of the materials you either</p> <p>5 brought here with you today or of which you are</p> <p>6 aware in the scientific community?</p> <p>7 A So it partly depends what you mean by "a</p> <p>8 meta-analysis." And in my lexicon, meta-analysis</p> <p>9 is a statistical procedure for summarizing a body</p> <p>10 of -- a set of results from individual studies.</p> <p>11 And that procedure is pretty standard -- has been</p> <p>12 pretty standard since the 1980s and 1990s, and</p> <p>13 there are some refinements since then.</p> <p>14 Sorry, I may have lost the thread of</p> <p>15 your question.</p> <p>16 Q If I were to try to look at a piece of</p> <p>17 scientific literature, be it in a book or an</p> <p>18 article, to find a published description of the</p> <p>19 method that you used to perform your meta-analysis</p> <p>20 in the MDL, where would I look?</p> <p>21 A The meta-analysis was conducted using a</p> <p>22 software that is well known, that is commercially</p> <p>23 available, and I think everyone would recognize</p> <p>24 the validity of the statistical procedures under</p> <p>25 those -- under that.</p>

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<p>1 If you're asking about which -- you</p> <p>2 know, there are decisions to be made about which</p> <p>3 studies to include, about which results from</p> <p>4 studies to include, and all of that sort of thing,</p> <p>5 which is not strictly part of the statistics of</p> <p>6 meta-analysis, it's sort of the step before</p> <p>7 meta-analysis, and that part is utterly unique to</p> <p>8 each situation.</p> <p>9 So if you're doing a meta-analysis of</p> <p>10 clinical trials that have all been designed</p> <p>11 basically in an identical way for an</p> <p>12 antihypertensive medication, and whether the study</p> <p>13 is done in Australia or California or Canada, the</p> <p>14 design is pretty standard, and a lot of it can</p> <p>15 be -- you can -- and you end up basically with a</p> <p>16 single result from the study, what is the impact</p> <p>17 on blood pressure -- the average impact on blood</p> <p>18 pressure among people who use it who were given</p> <p>19 the drug, the experimental group versus a</p> <p>20 comparison group, et cetera, that is one type of</p> <p>21 preparation for a meta-analysis.</p> <p>22 If you're dealing with observational</p> <p>23 epidemiology, as we are in the case of ovarian</p> <p>24 cancer, and some of the particularities of the</p> <p>25 literature in this domain, there are a lot of</p>	<p>1 clarify.</p> <p>2 So the three -- the three binders that</p> <p>3 you referred to as sort of this first set of</p> <p>4 materials, are those all references that are</p> <p>5 identified specifically in your report from the</p> <p>6 MDL?</p> <p>7 A Yes, I believe so. And just to be</p> <p>8 clear, when I was sent this material from the</p> <p>9 lawyers' office, it arrived in four binders. I'm</p> <p>10 not sure if you received the same four binders. I</p> <p>11 have re- -- I've taken some things out of there,</p> <p>12 so I have three binders of those things. Just --</p> <p>13 I don't know if there's confusion just between the</p> <p>14 three and four, but...</p> <p>15 Q What did you remove from the set of</p> <p>16 materials that you were provided by plaintiffs'</p> <p>17 counsel?</p> <p>18 A I removed the IARC reports, which I have</p> <p>19 in books, so I didn't need to carry around</p> <p>20 hundreds and hundreds of pages extra.</p> <p>21 I removed some other -- there was</p> <p>22 another report with, you know, thousands of --</p> <p>23 hundreds or -- at least of pages where I thought</p> <p>24 the relevant material was in -- contained in about</p> <p>25 20 pages. So I kept -- in material that I carry</p>
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<p>1 decisions that need to be made in the run-up to</p> <p>2 the meta-analysis.</p> <p>3 Q So in the situation where you are</p> <p>4 dealing with observational epidemiology, would it</p> <p>5 be fair to say that you are applying unique</p> <p>6 judgment in the selection of the studies that you</p> <p>7 include in your meta-analysis and, more</p> <p>8 specifically, what data from those studies you</p> <p>9 include.</p> <p>10 MS. PARFITT: Objection. Form.</p> <p>11 THE WITNESS: Any meta-analysis in this</p> <p>12 area would absolutely need to apply professional</p> <p>13 judgments to those things.</p> <p>14 BY MS. BRANSCOME:</p> <p>15 Q Okay.</p> <p>16 A Mine included and every -- everyone</p> <p>17 else's included.</p> <p>18 Q All right. So, Dr. Siemiatycki, getting</p> <p>19 back to the materials that you brought with you</p> <p>20 today, you mentioned that you brought three</p> <p>21 binders of scientific literature. Was that</p> <p>22 correct?</p> <p>23 A Three binders of the references to my</p> <p>24 report.</p> <p>25 Q Okay. So that's what I wanted to</p>	<p>1 around, I kept the 20 pages and put the rest away</p> <p>2 in a box.</p> <p>3 Q Do you remember which document that was?</p> <p>4 A If you give me a minute, I'll try to</p> <p>5 recreate that.</p> <p>6 Q We can check that at the break if you</p> <p>7 want --</p> <p>8 A Yeah. Sure, sure.</p> <p>9 Q -- to identify that document.</p> <p>10 So then you -- you spoke about an</p> <p>11 additional five binders --</p> <p>12 A Yeah.</p> <p>13 Q -- that you brought with you that</p> <p>14 contain documents that might help you answer</p> <p>15 questions during the deposition.</p> <p>16 Can you describe the contents of those</p> <p>17 five binders. I'm trying to avoid marking all of</p> <p>18 these as exhibits.</p> <p>19 A Yeah. Please.</p> <p>20 Okay. Let me just reach down and look</p> <p>21 at their covers.</p> <p>22 Yeah, so one contains the recent</p> <p>23 manuscript of a study by Taher, et al., a Canadian</p> <p>24 meta-analysis of the issue, plus -- let me see if</p> <p>25 there's anything else in there. I -- I think</p>

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<p>1 that's it. It's such a -- such a big report with 2 all the appendices and so on, that it takes up a 3 whole binder. 4 Another one, a smaller one, contains the 5 meta -- the main meta-analyses that have been done 6 in this area, apart from the Taher one. So the 7 Berge, Penninkilampi, a few other older ones, 8 Langseth and some of the older ones. 9 Q Are those materials that are in the set 10 of meta-analysis, the second binder, if you will, 11 are they replicated also in the other set of three 12 binders that you brought with you? 13 A Yes, they are. 14 Q Okay. 15 A Yes, they are. 16 Sorry. There's -- there's another one 17 in -- like that which contains all of the original 18 epidemiology studies that I used or that were 19 available to be used in the meta-analysis. And I 20 had this binder in my previous -- in the previous 21 case that I testified on, and I thought I -- I'd 22 like to have one binder here just of the 23 epidemiology studies because the thick binders, 24 it's harder for me to find articles, so it would 25 be easier for me to find them in this binder. So</p>	<p>1 identification.) 2 BY MS. BRANSCOME: 3 Q Now, Dr. Siemiatycki, with the exception 4 of a copy of your report, which you previously 5 testified has some handwritten annotations on it, 6 do any of the other materials that you brought 7 with you today have any notes, handwritten or 8 typed, or highlighting or any other form of 9 annotation? 10 A Yes. The -- the epidemiology studies 11 and probably the meta-analyses, the previous 12 meta-analyses. I -- I tend to scribble notes when 13 I'm reading an article on the side, so some of 14 those may very well have scribbled notes on -- in 15 the margins or things underlined. 16 Q Dealing first with the binder of the 17 original epidemiological studies that you said you 18 had at a prior deposition, have you annotated that 19 in any way since you brought that to another 20 deposition? 21 A Since today? Sorry. 22 MS. BRANSCOME: Michelle, perhaps you 23 could help me. 24 MS. PARFITT: Sure. Yeah, absolutely. 25 MS. BRANSCOME: Has that specific binder</p>
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<p>1 all of these are in the big binders. 2 And there's another one with Health 3 Canada weight of evidence guidelines. Also 4 guidelines from a European agency on weight of 5 evidence and evaluation. I think there might be 6 something from FDA about that, and also some of 7 the information regarding agency -- what agencies 8 have put on their websites, if anything, about 9 talc, which would include the National Cancer 10 Institute and some other agencies. 11 So these are mainly -- well, partly 12 printouts from websites. Partly the Canadian Risk 13 Management scope for talc published very recently 14 from the Canadian Department of Health. And this 15 sort of information. Not -- not all of those are 16 in the thick binders. 17 Q Are all of the documents in the binder 18 that you are holding there, which I think is your 19 fifth binder, are all of those documents 20 identified within your report or in your reference 21 materials? 22 A No. 23 Q I would like to mark that binder as 24 Exhibit 4. 25 (Exhibit No. 4 was marked for</p>	<p>1 been marked as an exhibit at a prior deposition? 2 MS. PARFITT: Let me see which one. 3 Ms. Branscome, I don't want to 4 represent -- and I would tell you that these were 5 all the studies that he's had over the course of 6 the last few years. I can't imagine it wasn't 7 asked for in prior depositions, but I can't -- I 8 can't represent -- 9 MS. BRANSCOME: Okay. 10 MS. PARFITT: -- one way or another. I 11 really can't. 12 MS. BRANSCOME: Let's go ahead. I would 13 like to mark the binder -- 14 MS. PARFITT: I will tell you this -- 15 maybe I can. There are pink numbers, number 10, 16 number 14, which suggest to me that they might 17 have been referenced in a deposition at one point 18 in time as an exhibit. 19 THE WITNESS: Not -- some of them, but 20 not all of them, have those numbers. 21 MS. PARFITT: Okay. 22 THE WITNESS: They also have numbers in 23 the corner of my -- my team's personal filing 24 system of articles, so things like that. 25 MS. BRANSCOME: Out of an abundance of</p>

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<p>1 caution, we will mark the binder that has been 2 described as containing the original 3 epidemiological studies as Exhibit 5, and the 4 binder that contains the meta-analyses as 5 Exhibit 6. 6 (Exhibit Nos. 5 and 6 were marked 7 for identification.) 8 BY MS. BRANSCOME: 9 Q Did you bring anything else with you to 10 the deposition today? 11 A Cell phone, glasses, et cetera, but no. 12 Q I was provided before the deposition 13 began with a single piece of paper that I 14 understand to be a bill for professional services. 15 If we could mark a copy of that as 16 Exhibit 7. 17 MS. BRANSCOME: Michelle, I don't know 18 if you have an extra copy. 19 MS. PARFITT: I do. 20 (Exhibit No. 7 was marked for 21 identification.) 22 MS. PARFITT: I have additional copies 23 for counsel, if you would like. 24 MS. BRANSCOME: I think we passed one 25 around.</p>	<p>1 A Okay. 2 Q So why don't we mark as Exhibit 8 the 3 bill for professional services that covers the 4 month of July. 5 (Exhibit No. 8 was marked for 6 identification.) 7 MS. PARFITT: Sure. I don't have extras 8 of those. Does anyone have a clamp? If I could 9 have one of those? Thank you. 10 MR. TISI: Number 7, for the record, is 11 the one that goes to November. 12 MS. BRANSCOME: We'll -- we'll clear it 13 up. 14 MR. TISI: Thank you. 15 THE WITNESS: Got it. 16 BY MS. BRANSCOME: 17 Q So, Dr. Siemiatycki, you have two 18 exhibits in front of you there, an Exhibit 7 and 19 an Exhibit 8. 20 Do they both contain bills for 21 professional services for the work that you have 22 done in connection with this litigation? 23 A Yes, they do. 24 Q And what has been marked as Exhibit 7 25 covers a work period of August 9th through</p>
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<p>1 BY MS. BRANSCOME: 2 Q Dr. Siemiatycki, do you recognize the 3 document that's been placed in front of you that's 4 been marked as Exhibit 7? 5 A Yes, I do. 6 Q And could you describe for the record 7 what this document is. 8 A It's a bill for services that I sent to 9 Ms. Parfitt dated November 18, 2018, in which I 10 billed for work done between August and November 11 2018 on the MDL case. 12 Q Is it correct that this is a bill that 13 covers 56 hours that you billed in connection with 14 your work on this case in the month of July 15 through August 2nd, 2018? 16 A Sorry, do -- July? Is this the same -- 17 MS. PARFITT: August. I have August to 18 November. 19 THE WITNESS: Do you have a bill labeled 20 July? 21 MS. PARFITT: We have July to August, 22 and here's the August -- 23 BY MS. BRANSCOME: 24 Q Sorry, we had different pieces of paper, 25 Dr. Siemiatycki.</p>	<p>1 November 16th, 2018, during which you billed 136 2 hours; is that correct? 3 A That's correct. 4 Q And then Exhibit 8 covers the period of 5 time July 1st through August 2nd, 2018, over which 6 you billed 56 hours; is that correct? 7 A That's correct. 8 Q And you bill for your time at \$450 an 9 hour, correct? 10 A That's correct. 11 Q Do the two bills for professional 12 services that have been marked as Exhibits 7 and 8 13 contain any time for work done by others at your 14 direction? 15 A They contain work that has been done by 16 a couple of -- by one research assistant, and I 17 make an arrangement with her to reimburse her for 18 her time. So it's -- it's covered in these, yes. 19 Q Okay. And so how is your research 20 assistant's time billed to plaintiffs' counsel? 21 A It's not billed. I -- I adjust the 22 billable hours to reflect the time that she works 23 for me. 24 Q So if I was looking at Exhibit 7 and 25 Exhibit 8, how much in terms of hours of this</p>

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<p>1 reflects your personal time?</p> <p>2 A Between 95 percent and 98 percent,</p> <p>3 almost all of it.</p> <p>4 Q And do the two exhibits that you have in</p> <p>5 front of you there, Exhibit 7 and Exhibit 8, does</p> <p>6 that cover all of the work that you have done in</p> <p>7 connection with forming your opinions in this</p> <p>8 case, meaning the MDL?</p> <p>9 A In forming the opinions for the report,</p> <p>10 yes.</p> <p>11 Q These bills do not include time that you</p> <p>12 spent preparing for today's deposition, correct?</p> <p>13 A That's correct.</p> <p>14 Q About how much time have you spent</p> <p>15 preparing for today's deposition?</p> <p>16 A I would say the time since November 18,</p> <p>17 which is referenced here, to today, there were</p> <p>18 actually two components. One was preparing for</p> <p>19 the deposition. Another was a bit of a flurry of</p> <p>20 activity in December, I think it was, when a</p> <p>21 couple of reports from Health Canada and from</p> <p>22 the Taher group were published, and I reviewed and</p> <p>23 tried to think about that information as well.</p> <p>24 So just to be as precise as possible, I</p> <p>25 just want to make that clear. It's not -- it</p>	<p>1 paper and the Health Canada statement?</p> <p>2 A No, I didn't.</p> <p>3 Q Did you annotate any of the materials</p> <p>4 that you reviewed?</p> <p>5 A I'm -- I'm not sure. I typically have a</p> <p>6 pen in my hand when I'm reading, so I couldn't say</p> <p>7 that I never underlined anything or -- I just</p> <p>8 don't recall making any -- and I don't know that I</p> <p>9 could find -- if I did look at it in December, I'm</p> <p>10 not sure I could find that copy because I -- I</p> <p>11 tend to print things over when -- and I -- there</p> <p>12 was nothing written that I wanted to retain. I</p> <p>13 didn't write anything that I have used or -- yeah.</p> <p>14 MS. BRANSCOME: We've been going for a</p> <p>15 little over an hour. Is now a good time to take a</p> <p>16 break?</p> <p>17 THE WITNESS: It's a great time.</p> <p>18 THE VIDEOGRAPHER: We are going off the</p> <p>19 record at 10:55 a.m.</p> <p>20 (Recess.)</p> <p>21 THE VIDEOGRAPHER: This begins disc</p> <p>22 number 2 in the deposition of Jack Siemiatycki.</p> <p>23 We're going back on the record at 11:15 a.m.</p> <p>24 BY MS. BRANSCOME:</p> <p>25 Q Before we took the break,</p>
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<p>1 wasn't only preparation. But I -- I guess we're</p> <p>2 talking about a couple of weeks' work in -- since</p> <p>3 November, but between six and ten days maybe,</p> <p>4 something in that ballpark.</p> <p>5 Q And how would -- what would that be in</p> <p>6 terms of hours?</p> <p>7 A Between 40 and 60 hours or -- subject to</p> <p>8 revision, I could -- I could look that up.</p> <p>9 Q Have you billed plaintiffs' counsel for</p> <p>10 that time yet?</p> <p>11 A No, I haven't.</p> <p>12 Q Presumably you will be billing them for</p> <p>13 the time you spend here today during your</p> <p>14 deposition as well, correct?</p> <p>15 A I -- I presume so as well.</p> <p>16 Q You referenced a flurry of activity in</p> <p>17 December related to the Health Canada information</p> <p>18 becoming public.</p> <p>19 Did you produce or generate any type of</p> <p>20 written work product in connection with your</p> <p>21 review of those materials?</p> <p>22 A No, I didn't.</p> <p>23 Q Did you take any notes while reviewing</p> <p>24 the materials that came out in December -- around</p> <p>25 December 2018 related to the Taher manuscript and</p>	<p>1 Dr. Siemiatycki, we were looking at the two bills</p> <p>2 for professional services that have been marked as</p> <p>3 Exhibit 7 and Exhibit 8.</p> <p>4 And so in addition to the 56 hours that</p> <p>5 are on Exhibit 8, the 136 hours on Exhibit 7, and</p> <p>6 the approximately 40 to 60 hours you have spent</p> <p>7 since mid-November of 2018, how much time have you</p> <p>8 spent in connection with your opinions across all</p> <p>9 talc litigation?</p> <p>10 MS. PARFITT: Objection to form.</p> <p>11 THE WITNESS: Including the previous</p> <p>12 case that I was involved in, you're saying?</p> <p>13 BY MS. BRANSCOME:</p> <p>14 Q Yes.</p> <p>15 A Whew. I -- four to six weeks maybe</p> <p>16 or -- I spent, I think, nearly two weeks in LA</p> <p>17 while that case was going on, so that's one big</p> <p>18 block of time. And then I -- at least a month</p> <p>19 full time, the equivalent of, before that. But,</p> <p>20 I'm sorry, I can't be more precise.</p> <p>21 Q What would that be in terms of hours?</p> <p>22 A Hours. Let's say eight hours a day --</p> <p>23 30, 40 -- 400 hours plus or minus 200.</p> <p>24 Q So a range of between 200 to 600 hours,</p> <p>25 do you think?</p>

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<p>1 MS. PARFITT: Object.</p> <p>2 THE WITNESS: It would be more than 200</p> <p>3 for sure. So -- to the best of my recollection,</p> <p>4 it might be between 400 and 600. But...</p> <p>5 BY MS. BRANSCOME:</p> <p>6 Q How much have you billed to date for all</p> <p>7 of the work you've done in connection with talc</p> <p>8 litigation?</p> <p>9 A Well, I -- I don't remember.</p> <p>10 MS. PARFITT: Don't guess.</p> <p>11 THE WITNESS: I don't remember a total.</p> <p>12 BY MS. BRANSCOME:</p> <p>13 Q Do you charge \$450 per hour for all</p> <p>14 types of work that you have done in connection</p> <p>15 with the talc litigation?</p> <p>16 A Yes, I do.</p> <p>17 Q Do the fees that you charge in</p> <p>18 connection with your work as an expert witness in</p> <p>19 the talc litigation go directly to you personally?</p> <p>20 A Yes, they do. Well, they go to a</p> <p>21 corporation that -- that I control, as you see in</p> <p>22 the bills.</p> <p>23 Q Do you pay anyone else for the -- using</p> <p>24 the funds that the corporation has received for</p> <p>25 the expert work you've done in connection with the</p>	<p>1 do you currently spend performing work in</p> <p>2 connection with litigation?</p> <p>3 A By presently, can you give me a time</p> <p>4 frame? You don't mean today, I presume. When you</p> <p>5 say -- do you mean in the last year? In the last</p> <p>6 10 years?</p> <p>7 Q Let's say over -- over the past 12</p> <p>8 months, what percent of your professional time was</p> <p>9 spent performing work in connection with</p> <p>10 litigation?</p> <p>11 A Ten to 20 percent ballpark.</p> <p>12 Q And has that percentage of time spent on</p> <p>13 work in connection with litigation changed over</p> <p>14 the past five years, for example?</p> <p>15 A Yes, it's very variable depending on</p> <p>16 requests for participation in litigation. So in</p> <p>17 the past five years, my main contact with</p> <p>18 litigation has been in the ovarian cancer cases,</p> <p>19 but at -- around five years ago, I was also</p> <p>20 working on two other cases in Canada.</p> <p>21 Sorry, what was the question?</p> <p>22 Q Sure. How -- I'll ask a new one.</p> <p>23 How has the percentage of time that --</p> <p>24 A Oh, oh.</p> <p>25 Q -- you spend in connection with work</p>
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<p>1 talc litigation?</p> <p>2 MS. PARFITT: Objection. Form.</p> <p>3 THE WITNESS: Yes, when I ask someone to</p> <p>4 do some specific tasks, I pay them for that.</p> <p>5 BY MS. BRANSCOME:</p> <p>6 Q And are the fees that you pay to other</p> <p>7 individuals for tasks that they do in support of</p> <p>8 your work, do those fees get billed to plaintiffs'</p> <p>9 counsel?</p> <p>10 A No, they don't.</p> <p>11 Q Can you give me an approximation of how</p> <p>12 much you have paid to others from the fees you</p> <p>13 have billed to plaintiffs' counsel?</p> <p>14 A In MDL or in total?</p> <p>15 Q In all of the talc litigation.</p> <p>16 A My guesstimate would be that it's in the</p> <p>17 order of 2 or 3 or 4 percent -- maybe 2 percent of</p> <p>18 the total that I've billed.</p> <p>19 Q So it's fair to say that approximately</p> <p>20 96 to 98 percent of all the fees that have been</p> <p>21 billed to plaintiffs' counsel for your work as an</p> <p>22 expert in the talc litigation will come to you</p> <p>23 personally?</p> <p>24 A Yes.</p> <p>25 Q What percent of your professional time</p>	<p>1 done related to litigation changed?</p> <p>2 A Any litigation, right?</p> <p>3 Q Yes.</p> <p>4 A Or -- or talc litigation?</p> <p>5 Q I'll start with all litigation.</p> <p>6 A So it's -- as I said, it's very variable</p> <p>7 from month to month. And -- and -- I mean, I</p> <p>8 guess over the past five years, it has kind of</p> <p>9 averaged out at about 10 percent of my time, 10 to</p> <p>10 20 percent of my time.</p> <p>11 Q And over the past two years, has all of</p> <p>12 the litigation work you've been doing, has that</p> <p>13 been exclusively focused on talc?</p> <p>14 A Yes.</p> <p>15 Q The report that -- sorry, the report you</p> <p>16 prepared in connection with the MDL is not the</p> <p>17 first expert report you have generated with</p> <p>18 respect to a potential link between talc and</p> <p>19 ovarian cancer, correct?</p> <p>20 A That's correct.</p> <p>21 Q You produced a report in connection with</p> <p>22 the talcum powder litigation dated October 4th,</p> <p>23 2016, correct?</p> <p>24 A That's correct.</p> <p>25 Q If you could turn in your binder there</p>

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<p>1 to tab 2.</p> <p>2 A In this big binder?</p> <p>3 Q Yes, please.</p> <p>4 Is the document behind tab 2 your expert</p> <p>5 report dated October 4th, 2016, that related to</p> <p>6 the talcum powder litigation?</p> <p>7 A Yes, it is.</p> <p>8 MS. BRANSCOME: I would like to mark</p> <p>9 that as Exhibit 9.</p> <p>10 (Exhibit No. 9 was marked for</p> <p>11 identification.)</p> <p>12 BY MS. BRANSCOME:</p> <p>13 Q The report marked as Exhibit 9 was not</p> <p>14 drafted for a particular case; is that correct?</p> <p>15 A I -- I -- I'd have to defer -- I'm not</p> <p>16 exactly sure sometimes whether these reports refer</p> <p>17 to a specific case or not.</p> <p>18 Q Okay. Let me do it this way: What was</p> <p>19 the question that you were attempting to answer in</p> <p>20 the report that has been marked as Exhibit 9?</p> <p>21 A So the question was the generic question</p> <p>22 of whether there is a causal relationship between</p> <p>23 use of talcum powder products and ovarian cancer.</p> <p>24 Q And specifically, the report marked as</p> <p>25 Exhibit 9, were you looking specifically at</p>	<p>1 specific to the Echeverria case, correct?</p> <p>2 A Correct.</p> <p>3 Q So the expert report that described the</p> <p>4 opinions that you were offering in that case is</p> <p>5 the one that we have just marked as Exhibit 9. Is</p> <p>6 that fair?</p> <p>7 MS. PARFITT: Objection. Form.</p> <p>8 THE WITNESS: I -- I'm -- I'm hesitating</p> <p>9 because I'm not sure what the significance of the</p> <p>10 phrase "the expert report that you offered" is. I</p> <p>11 didn't -- I didn't in a sense offer this report</p> <p>12 for -- at that trial. I testified at that trial,</p> <p>13 and they had this expert report available to them.</p> <p>14 BY MS. BRANSCOME:</p> <p>15 Q Okay. Let me ask it this way: You</p> <p>16 generated an expert report specific to the MDL,</p> <p>17 correct?</p> <p>18 A Yes.</p> <p>19 Q And we are going to look at that --</p> <p>20 A Yes.</p> <p>21 Q -- but that is a report that is dated at</p> <p>22 some point in 2018, correct?</p> <p>23 A Correct.</p> <p>24 Q Did you generate an expert report at any</p> <p>25 time in between the expert report that you</p>
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<p>1 perineal or genital use of talc?</p> <p>2 A That was the focus, yes.</p> <p>3 Q Did your 2016 report address any cancer</p> <p>4 risk associated with the inhalation of talc?</p> <p>5 A Not that I recall. It certainly wasn't</p> <p>6 a focus. There may have been some reason to</p> <p>7 allude to that issue, but I can't recall that</p> <p>8 it -- that there was.</p> <p>9 Q Okay. You had your deposition taken on</p> <p>10 December 15th and 16th, 2016, correct?</p> <p>11 A I believe so.</p> <p>12 Q And that deposition was for two specific</p> <p>13 cases, the Oules and the Daniels case, correct?</p> <p>14 A I guess so. But again, I -- that --</p> <p>15 I'm -- I don't recall exactly which cases.</p> <p>16 Q You also have testified at trial in a</p> <p>17 case involving allegations about Johnson's Baby</p> <p>18 Powder, correct?</p> <p>19 A That's correct.</p> <p>20 Q And that was the Echeverria case?</p> <p>21 A Yes, it was.</p> <p>22 Q And you testified in trial in August of</p> <p>23 2017, correct?</p> <p>24 A Correct.</p> <p>25 Q You did not issue an expert report</p>	<p>1 generated there in October 2016 and the expert</p> <p>2 report you have supplied that's dated November</p> <p>3 2018?</p> <p>4 A No, I did not.</p> <p>5 Q All right. So if I may, I would like to</p> <p>6 actually mark your copy of your 2018 report. And</p> <p>7 that will be marked as Exhibit 10, if you have</p> <p>8 that in front of you.</p> <p>9 (Exhibit No. 10 was marked for</p> <p>10 identification.)</p> <p>11 (Counsel conferring.)</p> <p>12 BY MS. BRANSCOME:</p> <p>13 Q To be clear, for the record, I'm marking</p> <p>14 as Exhibit 10 your MDL expert report, but it is</p> <p>15 your copy.</p> <p>16 A Yes.</p> <p>17 Q Okay. And as I understand it, the copy</p> <p>18 that you brought with you here today that's now</p> <p>19 been marked as Exhibit 10 contains some</p> <p>20 corrections. Is that -- is that fair?</p> <p>21 A Yes.</p> <p>22 Q Could you please walk me through the</p> <p>23 corrections that you have made to your 2018 MDL</p> <p>24 report that has been marked as deposition</p> <p>25 Exhibit 10.</p>

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<p>1 A Yes. So the first is on page 47. And</p> <p>2 in the first full paragraph that begins with</p> <p>3 "Table 9," on the fourth line --</p> <p>4 Q Let me pause you there for a moment,</p> <p>5 Dr. Siemiatycki. Are we both looking at page 47?</p> <p>6 A Now, I -- I'm not sure whether I printed</p> <p>7 this in a way that is not -- does not correspond</p> <p>8 to the version that you have. I'm sorry. I</p> <p>9 printed this just for my own use, so I didn't --</p> <p>10 Q No, looking at it, it looks similar.</p> <p>11 A Oh, okay.</p> <p>12 Q So why don't you direct me to the</p> <p>13 specific correction. I thought you were referring</p> <p>14 to the image of Table 9.</p> <p>15 MS. PARFITT: No, no. I think we're</p> <p>16 all on the same -- it's the same one you have --</p> <p>17 THE WITNESS: Okay.</p> <p>18 MS. PARFITT: -- on your thumb drives.</p> <p>19 THE WITNESS: Okay.</p> <p>20 BY MS. BRANSCOME:</p> <p>21 Q All right, we'll start again. So,</p> <p>22 Dr. Siemiatycki, if you could identify for me the</p> <p>23 corrections that you are making to your MDL report</p> <p>24 from November 2018.</p> <p>25 A Right. So on page 47, the first full</p>	<p>1 your copy of your report that there were other</p> <p>2 handwritten annotations.</p> <p>3 A Yeah.</p> <p>4 Q Can you please walk me through -- unless</p> <p>5 it's voluminous, in which case we can do it after</p> <p>6 a break -- any notations that you have made in</p> <p>7 your copy of your MDL report.</p> <p>8 A It's not voluminous. I didn't make</p> <p>9 many. One is on page 49. And in the middle of</p> <p>10 the page in italics, there is a misconception</p> <p>11 counting, et cetera, and just before that, I was</p> <p>12 talking about hospital-based studies and</p> <p>13 population-based studies. So the section that</p> <p>14 begins on page 48 is about hospital-based versus</p> <p>15 general population-based studies. And I made a</p> <p>16 note to myself after that -- at the end of that</p> <p>17 section, also --</p> <p>18 I mean, do you want me to quote what I</p> <p>19 wrote?</p> <p>20 Q Yes, please.</p> <p>21 A Sure. I said: "Also the basin for</p> <p>22 hospital controls may differ from the basin for</p> <p>23 cases."</p> <p>24 Q And what did you mean by that?</p> <p>25 A So, you're familiar with the idea, a</p>
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<p>1 paragraph, the fourth line, there are some</p> <p>2 numbers. It says "1.25," and then in parentheses,</p> <p>3 there is a 1.0 that was really a literal typo.</p> <p>4 Someone's -- my fingers were too heavy, and the</p> <p>5 one -- the first 1.0 should be dropped, and so the</p> <p>6 correct number is 1.15 to 1.36. Okay?</p> <p>7 The next one -- I'm sorry. Oh, the next</p> <p>8 one is on page 45, so a couple of pages earlier,</p> <p>9 in the second line -- are you with me? -- the</p> <p>10 sentence that begins "While the Terry 2013." It</p> <p>11 should be the Berge -- "While the Berge" -- the</p> <p>12 first Terry -- I'm just thinking out loud again.</p> <p>13 Whether in fact the Terry was the correct --</p> <p>14 anyway, yesterday when I was correcting this</p> <p>15 quickly, I thought that it -- that I had</p> <p>16 miswritten "Terry 2013" in that sentence and that</p> <p>17 it should have been Berge 2018.</p> <p>18 Do you mind if I look at this again at</p> <p>19 lunchtime and just verify which I was referring</p> <p>20 to? I'm now confusing myself about that.</p> <p>21 Q Not a problem. We can come back to that</p> <p>22 after -- either the next break or the lunch break.</p> <p>23 A And that -- those are the only</p> <p>24 corrections I picked up as I was going through it.</p> <p>25 Q I noticed as you were flipping through</p>	<p>1 hospital-based study? There are actually</p> <p>2 different types of hospital-based studies, which</p> <p>3 is something that has not come out in, really, in</p> <p>4 any of the discussion of this literature.</p> <p>5 But one of the problems with hospital-</p> <p>6 based studies is that when you choose a control</p> <p>7 group, let's say for a series of ovarian cancer</p> <p>8 cases from a given hospital, and you go to a</p> <p>9 different ward in that hospital to look for</p> <p>10 controls who are not -- don't have ovarian</p> <p>11 cancer -- the reasons for referral and the -- the</p> <p>12 pattern of patients coming to hospitals differs</p> <p>13 for different diseases. So serious -- it</p> <p>14 generally is the case that serious diseases in</p> <p>15 specialized hospitals tend to come from a wider</p> <p>16 geographic and social area than cases of traffic</p> <p>17 accident injuries or things that are treated in</p> <p>18 general hospitals more easily.</p> <p>19 And if you just take a series of cases</p> <p>20 of ovarian cancer and go to the emergency</p> <p>21 department to choose controls or you go to the GI</p> <p>22 surgery department where they do appendectomies</p> <p>23 routinely or something like that, you're picking</p> <p>24 up populations who are quite different.</p> <p>25 And this is one of the disadvantages of</p>

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<p>1 a hospital-based control strategy, and it's one of</p> <p>2 the reasons why, in general, epidemiologists favor</p> <p>3 population-based studies rather than hospital --</p> <p>4 case control studies, population-based case</p> <p>5 control studies, rather than hospital-based case</p> <p>6 control studies, because the cases and the</p> <p>7 controls -- one of the requisites in a case</p> <p>8 control design is that the patients -- the cases</p> <p>9 and the controls should represent the same study</p> <p>10 base, the same basin of people who if they were</p> <p>11 cases with the disease in question, ovarian</p> <p>12 cancer, this is where they would end up, and all</p> <p>13 of them would end up there.</p> <p>14 Q Are there any studies that were relevant</p> <p>15 to your analysis for your MDL report that you</p> <p>16 think this particular criticism that you have just</p> <p>17 explained applies to?</p> <p>18 A I'm not sure. I didn't examine them</p> <p>19 from that point of view.</p> <p>20 In this section of my report, it was</p> <p>21 kind of a generic discussion of the issue of -- of</p> <p>22 the merits of hospital-based versus population-</p> <p>23 based studies.</p> <p>24 Q Okay. Do you have any other annotations</p> <p>25 that you made in your copy of your MDL report?</p>	<p>1 THE VIDEOGRAPHER: We're going back on</p> <p>2 the record at 11:41 a.m.</p> <p>3 BY MS. BRANSCOME:</p> <p>4 Q Do you have any other annotations there</p> <p>5 with you on your copy of your report?</p> <p>6 A No. I have one other green sticky on</p> <p>7 page 67, but there's nothing written on that page,</p> <p>8 and I don't remember why I put that sticky there.</p> <p>9 Q Okay. The report that we just marked as</p> <p>10 Exhibit 10, does that define the scope of your</p> <p>11 opinions in the MDL?</p> <p>12 A The scope of my opinions. It defines my</p> <p>13 opinions, yes.</p> <p>14 Q Does it contain all of the opinions that</p> <p>15 you intend to offer at any trial or hearing in the</p> <p>16 MDL?</p> <p>17 A I mean, I guess if I'm asked a question</p> <p>18 that veers off from something I said in my report,</p> <p>19 and I address the question, would that be</p> <p>20 considered going off -- you know, offering an</p> <p>21 opinion that is not in my report?</p> <p>22 It's just that -- I'm just not sure</p> <p>23 about the technicality of your question. I mean,</p> <p>24 I will offer -- I will answer questions even if</p> <p>25 they lead off the content of my report.</p>
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<p>1 A At the bottom of that same page, 49, I</p> <p>2 wrote, quote, "Borenstein." And right now I'm --</p> <p>3 oh, yes. So this misconception about counting the</p> <p>4 number of statistically significant results as a</p> <p>5 valid way of assessing consistency of results</p> <p>6 among different studies is a basic flaw in the</p> <p>7 conduct and interpretation of how to review a</p> <p>8 series of studies.</p> <p>9 It's well known. I've known and I -- I</p> <p>10 said it in my report that this is absolutely not</p> <p>11 the way to synthesize evidence from multiple</p> <p>12 studies, to count the number of significant ones.</p> <p>13 And in addition to me saying it and many others, I</p> <p>14 thought that I could -- if you asked me questions</p> <p>15 about it or challenged my opinion on that score, I</p> <p>16 could quote the textbook on meta-analysis, which</p> <p>17 gives some good examples of why that's wrong.</p> <p>18 MS. PARFITT: Let's stop here for a</p> <p>19 minute --</p> <p>20 MS. BRANSCOME: If we could go off the</p> <p>21 record.</p> <p>22 MS. PARFITT: -- and go off the record.</p> <p>23 THE VIDEOGRAPHER: We're going off the</p> <p>24 record at 11:39 a.m.</p> <p>25 (Pause.)</p>	<p>1 Q As you sit here today --</p> <p>2 A Yes.</p> <p>3 Q -- does the report that has been marked</p> <p>4 as Exhibit 10 contain all of the opinions that you</p> <p>5 have formed as of today about which you would</p> <p>6 intend to testify at trial or a hearing on this</p> <p>7 matter?</p> <p>8 A I -- I believe so.</p> <p>9 Q What was the question that you were</p> <p>10 asked to answer in connection with the report you</p> <p>11 generated in 2018?</p> <p>12 A I guess I -- I'll just refer back to</p> <p>13 what it says in the report: "Can application of</p> <p>14 talcum powder products in the perineal region</p> <p>15 cause ovarian cancer?"</p> <p>16 Q Is that question different from the</p> <p>17 question you were answering in your 2016 report?</p> <p>18 A I -- I don't see them as different.</p> <p>19 Q You would agree with me, though, that</p> <p>20 there are differences between the report that you</p> <p>21 produced in November 2018 and the report that you</p> <p>22 produced in October 2016?</p> <p>23 MS. PARFITT: Objection. Form. Vague.</p> <p>24 THE WITNESS: Yes, there are some</p> <p>25 differences.</p>

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<p style="text-align: right;">Page 70</p> <p>1 BY MS. BRANSCOME: 2 Q When you began drafting the report 3 that's been marked there as Exhibit 10, your MDL 4 report, did you begin by using your 2016 report as 5 an initial draft? 6 A Yes. But I also had some ideas about 7 new things that I would want to do. Sort of 8 coming out of the Echeverria experience, I 9 realized that there were -- there were a couple of 10 errors in that -- my original report that I wanted 11 to correct. There were ways of doing the analyses 12 that, on reflection, I thought were not optimal 13 and that I could improve on, even if I anticipated 14 that the bottom line results would not change 15 much. But when I came to actually drafting the 16 text, I certainly used the previous report as a 17 primary source for revising -- for -- for drafting 18 the new one. 19 Q You mentioned that you wanted to make 20 some modifications because there were things in 21 the 2016 report that were either not optimal or 22 were errors. 23 Were any of the modifications that you 24 made done at the suggestion of plaintiffs' 25 counsel?</p>	<p style="text-align: right;">Page 72</p> <p>1 sequence, and I use both of them now but in 2 different places. 3 But -- so is your question, is it 4 exactly the same computer that all the files were 5 kept on or -- is that the sense of your question? 6 BY MS. BRANSCOME: 7 Q How about I ask it this way: Can you 8 describe for me the process by which you drafted 9 your 2018 report that's been marked as Exhibit 10? 10 A So I guess there were two parallel 11 things going on, or maybe more. One was to do 12 some reanalyses of the statistical meta-analysis. 13 And so that I initiated at a certain point 14 between -- probably in 2018. 15 At the same time, and I'm not sure if 16 this was after or before the statistical analyses 17 were started, I looked at the old draft. I 18 reviewed what was there, what I thought were 19 weaknesses in the way of expressing things or 20 things that could be brought to the report that 21 would enhance the clarity or the force of the -- 22 the exposition, and I started redrafting. So I'm 23 not sure if that answers your question. 24 Q Did you personally type the words that 25 are contained in Exhibit 10?</p>
<p style="text-align: right;">Page 71</p> <p>1 MS. PARFITT: Objection. 2 THE WITNESS: No. 3 BY MS. BRANSCOME: 4 Q So any of the changes that you made 5 between your 2016 report and the MDL report in 6 2018, were those all at your own prompting? 7 A Yes. 8 MS. PARFITT: Objection. Form. 9 THE WITNESS: Yes. 10 BY MS. BRANSCOME: 11 Q Did you work in the same computer file 12 to draft the 2018 report from start to finish? 13 MS. PARFITT: Objection. Form. 14 THE WITNESS: You're -- you're referring 15 to the text, not the statistical analyses, which 16 were done in a separate -- I mean, they -- they -- 17 the statistical analyses were based on the 18 addendum that I presented to you, and those are 19 kept on a FileMaker software, which is not on my 20 personal computer, but that my assistant has 21 access to. 22 But as far as the text is concerned -- 23 yeah, I think it was the same computer, but I've 24 changed computers since then, so I'm just 25 hesitating because I'm trying to think of the time</p>	<p style="text-align: right;">Page 73</p> <p>1 A All -- maybe all of them, and maybe 2 there were some paragraphs that I handwrote 3 because I was on a plane or a train, and when I 4 got back to the office, I asked someone to type up 5 that paragraph or two. But basically it was done 6 by me. 7 Q And did you save draft versions along 8 the way? 9 MS. PARFITT: Objection. Form. 10 THE WITNESS: Not really. Not -- 11 certainly not systematically. I didn't see any 12 reason to save discarded versions of things. 13 Yeah. 14 BY MS. BRANSCOME: 15 Q Did you conduct a new literature review 16 in connection with the 2018 report? 17 A I knew that I had all of the literature 18 that was pertinent and published as of 2016. 19 Updating what was available was partly done by 20 asking my research assistant to do a PubMed search 21 of anything new on the topic; asking the lawyers 22 if they had come across anything new in the past 23 year; my own antenna of knowing a lot of 24 epidemiologists and people who work in this area, 25 whether they are aware of anything. So sort of an</p>

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<p>1 informal updating process from many branches. 2 Q Did plaintiffs' counsel provide you with 3 studies that had come out since you had generated 4 your 2016 report? 5 A I think they sort of pointed me to a 6 couple of things that I didn't have at the time. 7 I think one was the Penninkilampi review. 8 We're talking about the epidemiology 9 literature or everything? Because the 10 epidemiology literature I was pretty much in 11 control of through my networks and my people and 12 so on. 13 The stuff that I asked counsel to help 14 with was identifying literature in the areas of 15 toxicology, composition of talcum powder products, 16 mechanistic research that would bear on the issue. 17 So I asked them if they would provide me any new 18 data that they had available on those topics. 19 Q Do you consider yourself an expert in 20 toxicology? 21 A No. I'm sufficiently familiar to be 22 able to integrate the expertise of -- of real 23 experts. 24 Q Do you consider yourself an expert on 25 the composition of talc?</p>	<p>1 statistical analysis for your meta-analysis? 2 A It's -- I think it's called 3 Meta-Analysis, but -- it's called Comprehensive 4 Meta-Analysis, Version 3. It's listed in my 5 report on page 34. 6 Q And is that the only software that you 7 used to perform the statistical analyses in your 8 report? 9 A It's the only software that I used to 10 perform the meta-analyses. Are there any other -- 11 I'm just trying to think if there are any other 12 analyses in the report besides meta-analyses or 13 statistical. 14 There were a couple of studies, and I -- 15 I couldn't point them out just this minute, that 16 did not provide full information allowing -- that 17 didn't provide full information on odds ratios or 18 relative risks in a format that was useful for the 19 meta-analysis. And -- but they did provide the 20 numbers of cases and controls who were exposed and 21 unexposed. And that would typically -- I think in 22 at least one instance, maybe two, but at least one 23 instance, there was a situation where they 24 provided odds ratio estimates in different 25 categories of usage of talc or either different</p>
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<p>1 A No. 2 Q And do you consider yourself an expert 3 on potential biological mechanisms of the 4 development of ovarian cancer? 5 A No. 6 Q Other than being aware of the opinions 7 of others in those particular fields, are you 8 offering any expert opinions in toxicology, the 9 composition of talc, or the biological mechanism 10 by which ovarian cancer may develop? 11 A I'm -- 12 MS. PARFITT: Objection. Form. 13 Go ahead. 14 THE WITNESS: I'm -- I reviewed the 15 information that I was provided, and I took note 16 of the types of evidence that are available in 17 those domains, and I used it mainly in thinking 18 about biological plausibility of the association. 19 It -- those areas of evidence did not in any way 20 influence my opinions about the strength and 21 consistency and so on of the epidemiological 22 evidence. 23 BY MS. BRANSCOME: 24 Q Did you -- oh, before I forget, what is 25 the name of the software that you used to do the</p>	<p>1 durations or different amounts used per day or 2 something like that, but didn't summarize that in 3 an overall ever-used-it-at-all versus 4 never-used-it, which was what I was looking to use 5 in the meta-analysis. 6 And I think in those -- in that 7 instance, I did almost a hand calculation. 8 Because it's pretty straightforward how you do 9 this, just re- -- picking the numbers in their 10 tables and recalculating the overall odds ratio. 11 But this is a few years ago, and I -- 12 I -- I would have to go back and review that, but 13 it was -- I think in the other meta-analyses, 14 Berge and Penninkilampi, which were carried out 15 completely independently of mine, and I didn't 16 know about theirs, I think they had to do 17 something similar and arrived at the same answers. 18 So -- but, no, I mean there was no -- no 19 other statistical package used. That kind of 20 calculation can be done by hand. 21 Q How would -- how would I, if I'm looking 22 at your report, identify which studies you 23 actually calculated the odds ratio or relative 24 risk that you input into your meta-analyses? 25 A I -- I -- I'd have to look at it at</p>

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<p>1 lunchtime, if you don't mind, and see if there was 2 one. 3 There was one. I don't know if that was 4 retained in the end or if -- I'm sorry. It's -- 5 Q When you say you don't know if a study 6 was retained in the end, are there studies that 7 you considered including in your meta-analysis and 8 ultimately did not? 9 A Only if they didn't provide evidence on 10 the relationship between talcum powder used in the 11 perineal area and ovarian cancer. 12 Q All right. If you wouldn't mind looking 13 at that at lunch, we will come back -- 14 A Yes. Thank you. 15 Q -- to that after the lunch break. 16 THE WITNESS: Someone make a note for 17 me. 18 BY MS. BRANSCOME: 19 Q Did you -- 20 MS. PARFITT: Yes, a note. 21 BY MS. BRANSCOME: 22 Q Did you personally conduct the 23 meta-analysis that was performed as part of your 24 2018 report? 25 A No, I did not do the --</p>	<p>1 from one to another was perfectly in line with 2 what I would expect. 3 Furthermore, the results that we 4 obtained are almost identical to the results that 5 others have independently obtained doing 6 meta-analyses on these topics using basically the 7 same studies. Sometimes the difference of -- 8 minor differences of which result from each study 9 they selected, but basically the results are so 10 similar that I'm confident that there was no 11 glitch. 12 Q Did you save the results of these 13 sensitivity analyses? 14 A Do you mean the output from the computer 15 software for each one? Is that what you're -- 16 Q Is there any way from the materials that 17 you have produced in connection with your report 18 for someone to replicate the sensitivity analyses 19 that you performed? 20 MS. PARFITT: Objection. Form. 21 THE WITNESS: Well -- I reproduced in 22 the report a few plots of -- that come straight 23 out of the program. So for those, it's absolutely 24 replicatable. Anybody can then go to the package 25 and put -- punch in the same input, and they'll --</p>
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<p>1 Q Who did that? 2 A My student. 3 Q And what is your student's name? 4 A Mengting, M-E-N-G-T-I-N-G, Xu, X-U. 5 Q And -- and what are -- is it Mr. or 6 Dr. Xu? 7 A It's -- she's a Ph.D. student at the 8 moment. She will be a doctor. 9 Q What are her qualifications for 10 conducting a meta-analysis? 11 A She is very skilled at statistical 12 analyses and at -- at computer packages. I'm not 13 sure if she's taken a course in meta-analysis 14 specifically, but it's not rocket science to do 15 that with a package like the one we have. 16 Q Did you verify that the meta-analysis 17 was performed correctly using the software? 18 A I looked at the results in various ways 19 to assure myself that everything looked good. By 20 looking good, I mean that there was internal 21 coherence, like she carried out many different 22 meta-analyses under different conditions and -- 23 not different conditions, but including some 24 studies and excluding studies -- these are called 25 sensitivity analyses -- and the pattern of results</p>	<p>1 they'll get the same output. For the -- I didn't 2 do that for every single sensitivity analysis, 3 just for economy -- to save the reader the burden 4 of that. But I'm pretty sure -- I'm pretty sure 5 that Mengting kept files of each of those 6 analyses. 7 BY MS. BRANSCOME: 8 Q Did anyone else -- you mentioned a 9 research assistant helped you with PubMed 10 searches. Who was the research assistant? 11 A She's a woman, who was with me for 30 12 years or so, who was basically the bibliographic 13 expert in our team and helped people find articles 14 and do things necessary, like PubMed searches and 15 so on. So she -- while she was here -- she 16 retired a year or so ago. While she was here, I 17 asked her to look at the ovarian cancer/talc 18 thing, and she dug out some -- she found some 19 articles for me. 20 Q Is that Sally Campbell? 21 A Yes, it is. 22 Q Okay. After Ms. Campbell retired, did 23 anyone else help you perform literature searches? 24 A Not in a routine way for sure. If I 25 wanted to find a specific article that I knew</p>

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<p>1 about, I would typically ask my student Mengting 2 to dig it out and print it for me. 3 Q So in addition to Ms. Campbell and 4 Ms. Xu -- 5 A Xu, yes. 6 Q -- did anyone else help prepare the 7 materials that are in your 2018 report? 8 A Yes. So I have another research 9 assistant who's been with me even longer than 10 Sally Campbell, who retired a month ago, and her 11 name is Lesley Richardson. And she set up and 12 maintained the database system in which we 13 integrated all of the results that are in that 14 addendum that I provided you, and that involved 15 reviewing each article and taking every single 16 result and plugging it into this software. 17 Q Did Ms. Richardson exercise any of her 18 own judgment in selecting which data to include in 19 the meta-analyses? 20 A The instruction was to extract 21 everything. Simple instructions can become 22 difficult in operation. And some of the 23 frustration in this area and some of the reason 24 why there is some variability in which studies and 25 which results are included in different</p>	<p>1 Q Okay. And you mentioned reviewing the 2 materials that came out in connection with Health 3 Canada and the Taher manuscript, and we'll talk 4 about that in more detail, but did anything you 5 reviewed since the production of your 2018 report, 6 has any of that changed your opinions or any of 7 the information that is contained in your MDL 8 report? 9 A It doesn't really change anything. I 10 would say that the Health Canada report reinforces 11 the notion that this issue is becoming a front 12 burner issue for public health agencies. But 13 it -- since I didn't explicitly address that 14 question in my report, I would say it doesn't 15 change anything that's in my report. 16 Q Do you intend to offer expert opinions 17 about the different positions of the different 18 public agencies and the relative importance of a 19 potential connection between talc and ovarian 20 cancer? 21 MS. PARFITT: Objection. Form. 22 THE WITNESS: Did I intend -- while 23 writing my report, do you mean, to make -- no. I 24 don't think that those agencies and those 25 positions necessarily reflect the most up-to-date</p>
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<p>1 meta-analyses occur because authors are sometimes 2 cryptic about what they say about their data and 3 their results. And specifically things like what 4 kind of talc use a certain table describes is not 5 always perfectly clear. 6 And so she would need to make a judgment 7 sometimes as to whether this result pertained to 8 all use of talc in the perineal area or only 9 powdering, excluding sanitary napkins or other -- 10 sometimes it -- there's ambiguity in the write-up 11 of these things that therefore requires -- 12 required some judgment on her part. And several 13 of these things she would ask my opinion about, 14 and we would discuss it and say, Well, it looks 15 like this or it looks like that, and let's go with 16 this interpretation. 17 Q Okay. And at the end of the day, 18 despite receiving help from others in developing 19 your 2018 report, do you personally stand behind 20 everything that is in the report? 21 A Yes. Barring more typos. I know that 22 every time I look at anything I've ever written 23 or, you know, things that are expressed not in the 24 most clear way. But, yes, I stand behind 25 everything.</p>	<p>1 science, and I think the most up-to-date science 2 is in the science community through publications 3 and so on, and public health policies tend to lag 4 behind scientific knowledge. 5 BY MS. BRANSCOME: 6 Q Are there instances where public health 7 policies are more conservative than the scientific 8 literature out of sort of a principle of 9 precaution? 10 MS. PARFITT: Objection. Form. 11 THE WITNESS: Sorry, I'm not sure I 12 understand the question. 13 BY MS. BRANSCOME: 14 Q Sure. 15 Are there examples where the public 16 health policy is actually, for instance, more 17 protective than the science might support because 18 the public health agency is exercising an 19 abundance of caution? 20 MS. PARFITT: Objection. Form. 21 THE WITNESS: I -- I believe so. I 22 mean, I've not done any kind of survey of how 23 public health policy in, you know, Sweden over 24 Argentina or everywhere -- you're talking about 25 generally in the world public health or are you</p>

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<p>1 talking about United States or -- but I -- I 2 imagine there are instances like that, and I think 3 there is a strand in public health to be 4 precautionary in developing policies. But I'm not 5 sure it's universal. I just don't know. 6 BY MS. BRANSCOME: 7 Q You have a References section in your 8 report. It begins at page 109, if you need to 9 refer to it. 10 How did you maintain all of the 11 documents that are identified under that list? 12 It's quite voluminous. 13 A So let me -- 14 Q And by that, I mean did you keep hard 15 copies? Do you keep electronic copies? 16 A Okay. So the first thing I'll point out 17 is that I deliberately didn't call it a reference 18 section. You'll see that it's called a 19 Bibliography. 20 Q Could you turn to page 109 in your 21 report. 22 A That -- that's where I am. 23 Q Could you turn to the page right before 24 that. 25 A Oh. Ah, yes, I see that.</p>	<p>1 A So, yeah, yeah. 2 Q -- Dr. Siemiatycki, is how -- how do you 3 maintain all of the documents that are listed in 4 your reference section? Do you main hard copies? 5 Do you keep electronic copies? 6 A It's a bit of a mix and match of 7 electronic and hard copies. And these are all the 8 materials that were collected over the years, you 9 know, I would say from the beginning of my 10 involvement in the previous trial and so on, that 11 concern talc and ovarian cancer, including 12 materials that were provided by the lawyers and 13 materials that we found. 14 I prefer to work with paper -- I prefer 15 to read paper, but at a certain point, that gets 16 overwhelming, and the material -- I can't tell you 17 right now for sure that everything here is -- that 18 I have it electronically in a file or that I have 19 it in paper. 20 Q There are different sections of your 21 References section. You have Bibliography Part A, 22 B, so on and so forth. Who made the decision of 23 which articles or documents fell into which of 24 the -- of each category? 25 A I -- I guess I made it, but it was</p>
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<p>1 Q What is the page -- you have that as 2 page 108? 3 A Yes, I have that page with the word 4 "References" on page 108. Section 16. 5 Q Perhaps we could check at the break. My 6 page numbering got off of yours at some point. 7 A Okay. 8 Q But in any event, you do have a 9 Section 16 that's titled "References," correct? 10 A Yes. Yes, I do. I do. 11 Okay. My -- my conscious volition was 12 to call this a bibliography, and the word 13 "references" got in -- into the heading of this 14 section. 15 And the reason for that distinction is 16 that I have not -- not everything that is listed 17 is referred to in the text of my report. So 18 technically speaking, a reference section should 19 be those materials that you refer to in your 20 report. And this is not what I have here. And 21 that's why I -- consciously I wanted to call this 22 a bibliography, and somehow the word "references" 23 got -- when they -- when we were compiling it -- 24 anyways. 25 Q Okay. So my question again --</p>	<p>1 pretty self-evident. The material in Part A is 2 material that is generally publicly available. 3 It's easy to identify that. And the materials in 4 Part B is material that is not publicly available. 5 And all of that came from the lawyers, I think. 6 Q So that was going to be one of my 7 questions. Did all of the materials identified in 8 Bibliography Part B come to you from plaintiffs' 9 counsel? 10 A Okay. So let me look through this 11 quickly. 12 MS. PARFITT: Mm-hmm. Go ahead. 13 THE WITNESS: (Peruses document.) 14 I think so. I -- I think all of it came 15 from plaintiffs' counsel. 16 BY MS. BRANSCOME: 17 Q I'm not going to ask you about all of 18 these, but I noticed on page, at least in my copy, 19 135, maybe 134 on yours, there's reference to the 20 Berg v. Johnson & Johnson case. 21 Do you see that? 22 A Yes, I see that. 23 Q What relevance is it to you as an 24 epidemiologist evaluating the potential risk of 25 ovarian cancer from perineal use of talc to look</p>

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<p>1 at the final jury instructions, judgment, and</p> <p>2 verdict form from the Berg case?</p> <p>3 A I'm not sure. I relied on plaintiffs'</p> <p>4 counsel to decide what they thought it would be</p> <p>5 pertinent for me to be aware of. So these were</p> <p>6 documents that they thought would be pertinent for</p> <p>7 me to -- to be aware of, and I can't say why, and</p> <p>8 I don't remember -- frankly, I don't remember</p> <p>9 these documents.</p> <p>10 Q As a scientist, do you typically</p> <p>11 consider jury instructions in forming an opinion</p> <p>12 with respect to risk of the use of a product in</p> <p>13 epidemiology?</p> <p>14 MS. PARFITT: Objection.</p> <p>15 THE WITNESS: Outside of a legal -- no,</p> <p>16 we wouldn't have access to it or -- no, it never</p> <p>17 comes up.</p> <p>18 BY MS. BRANSCOME:</p> <p>19 Q As you sit here today, can you come up</p> <p>20 with any reason why the jury instructions in a</p> <p>21 case would be relevant to you in evaluating the</p> <p>22 question you were asked to answer, which is</p> <p>23 whether or not there is a risk of ovarian cancer</p> <p>24 from the perineal use of talc?</p> <p>25 MS. PARFITT: Objection. Form.</p>	<p>1 informative of your opinions?</p> <p>2 A No. There's no way for anyone else to</p> <p>3 know that.</p> <p>4 Q Okay. Did you ask plaintiffs' counsel</p> <p>5 for specific company documents, using that term</p> <p>6 loosely, to refer to documents that are kept</p> <p>7 internally within the various companies at issue</p> <p>8 in this litigation?</p> <p>9 A I asked to be sent any information they</p> <p>10 had about the composition of talcum powder</p> <p>11 products, historically as well as currently, but</p> <p>12 actually mainly historic -- I was mainly</p> <p>13 interested to know what was the history of the</p> <p>14 composition of talcum powder products.</p> <p>15 And so many of these materials that they</p> <p>16 sent me -- and I can't tell you which ones because</p> <p>17 I don't identify them with these obscure numbers,</p> <p>18 they don't mean anything to me -- but some of them</p> <p>19 dealt with internal company documents or internal</p> <p>20 reports that discussed different types of talc --</p> <p>21 of powdering products, whether talc products or</p> <p>22 cornstarch products in different eras, when they</p> <p>23 started and when, what the market share was in</p> <p>24 different eras. So I was interested in that to</p> <p>25 get a sense of what were the women exposed to who</p>
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<p>1 THE WITNESS: You're asking me to</p> <p>2 speculate as to why plaintiffs' counsel would have</p> <p>3 sent this to me?</p> <p>4 BY MS. BRANSCOME:</p> <p>5 Q I'm asking --</p> <p>6 A Is that what you're asking?</p> <p>7 Q I'm asking if you, as the scientist</p> <p>8 whose name is on this expert report, can you think</p> <p>9 of any reason why that would be informative to you</p> <p>10 as a scientist?</p> <p>11 A If I had it in front of me, I might</p> <p>12 recognize something in there that would make it</p> <p>13 relevant. But I -- I don't know what is typically</p> <p>14 in such jury instructions. I don't know how --</p> <p>15 what the sweep is of those things. I'm just not</p> <p>16 sure. So I -- I can't answer the question.</p> <p>17 Q As you sit here today, do you recall</p> <p>18 reading the final jury instructions from Berg --</p> <p>19 A I don't --</p> <p>20 Q -- v. Johnson & Johnson?</p> <p>21 A I don't actually recall reading it.</p> <p>22 Q Okay. So is there any way for someone</p> <p>23 reviewing your report to identify within the</p> <p>24 reference section, Part B, which of these</p> <p>25 documents you, Dr. Siemiatycki, found relevant and</p>	<p>1 were part of these epidemiologic studies.</p> <p>2 Q Do you rely on any of the information</p> <p>3 that you obtained from documents in Part B of your</p> <p>4 reference list as a basis for forming your expert</p> <p>5 opinion in the MDL?</p> <p>6 A No. No.</p> <p>7 Q Have you viewed any of the deposition</p> <p>8 transcripts of the depositions that have been</p> <p>9 taken in the MDL?</p> <p>10 A I have looked at a few of them.</p> <p>11 Q And which deposition transcripts have</p> <p>12 you reviewed?</p> <p>13 A Plunkett, McTiernan, is it? And Singh.</p> <p>14 Not fully -- not the entire transcripts, but</p> <p>15 portions thereof. Blount. I've seen excerpts</p> <p>16 from, is it, Hopkins? And a table from Pier, but</p> <p>17 not the full text. I didn't review the full text</p> <p>18 -- transcript. There may be one or two more, and</p> <p>19 I can't recall right now.</p> <p>20 Q Okay. Focussing specifically on the</p> <p>21 expert deposition transcripts from the MDL, did</p> <p>22 you ask specifically for Drs. Plunkett, McTiernan</p> <p>23 and Singh's deposition transcripts?</p> <p>24 A I didn't know who the other experts</p> <p>25 were, so I didn't ask for them by name. And I</p>

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<p style="text-align: right;">Page 94</p> <p>1 think that I asked if they could share with me 2 transcripts of depositions and reports. So I also 3 had some of the reports from those experts. I'm 4 not sure I had all of them but at least some of 5 them. 6 Q Well, what materials had you reviewed 7 with respect to other experts in the MDL before 8 you completed your report that we've marked as 9 Exhibit 10? 10 A None. All of what I've just described 11 was after I completed my report. 12 Q Did you rely on the work or opinions of 13 any other expert witnesses in forming your own 14 opinions in the MDL? 15 A No, I don't think I did. 16 Q So understanding that more depositions 17 have been taken than just Drs. Plunkett, McTiernan 18 and Singh, what specifically was your request to 19 plaintiffs' counsel for which deposition 20 transcripts you would like to see? 21 MS. PARFITT: Objection. Asked and 22 answered, form. 23 THE WITNESS: I'm not sure if my request 24 was to see the ones that they thought were most 25 relevant to -- to me or whether I specifically</p>	<p style="text-align: right;">Page 96</p> <p>1 I specifically asked at some point to be provided 2 with information that would inform on the presence 3 of asbestos fibers in talcum powder products. 4 BY MS. BRANSCOME: 5 Q Did you review that material before 6 completing your MDL report? 7 MS. PARFITT: Do you understand the 8 question? 9 THE WITNESS: Yeah. 10 Yes, I think I did look at that before 11 completing my report. 12 BY MS. BRANSCOME: 13 Q When you say the asbestos is an issue 14 that has come up in the last few months, what do 15 you mean by that? 16 A Well, my understanding back in 2016, 17 '17, was that while asbestos had been detected in 18 talcum powder products as far back as the '70s -- 19 1970s, there was an industry directive or promise 20 or instruction that they would somehow get rid of 21 the problem of asbestos contamination. 22 Q And what was your basis for that 23 understanding? 24 A I guess things I've read, and possibly 25 in some of the company documents, possibly in</p>
<p style="text-align: right;">Page 95</p> <p>1 said the epidemiology ones, but I think probably 2 the former, because they sent me, for example, 3 Dr. Plunkett, who is not an epidemiologist. Yeah. 4 BY MS. BRANSCOME: 5 Q Which expert reports have you reviewed 6 that are from the MDL? 7 A I looked at the Plunkett report. I 8 think I looked at the Singh and the McTiernan 9 report. But just dipping into it, not -- not 10 reading it fully. Yeah. 11 Q Any other reports? 12 A Not that I recall offhand. 13 Q Okay. The Blount transcript, the 14 Hopkins transcript, and the table from Julie 15 Pier's deposition, were those items that were 16 provided to you by plaintiffs' counsel? 17 A Yes. 18 Q Did you request them specifically or 19 were they simply given to you? 20 MS. PARFITT: Objection. Form. 21 THE WITNESS: I requested them to 22 provide me with information that would help me to 23 understand the issue. And one of the issues that 24 has come up in the past few months was the issue 25 of asbestos in talcum powder products, and I think</p>	<p style="text-align: right;">Page 97</p> <p>1 publications. I think there have been various 2 publications that have said so that have -- and I 3 can't right now point to those, but that for the 4 last 10 or 20 years have said that asbestos 5 contamination may have been a problem up to the 6 1970s, but that the industry has basically managed 7 to eliminate that contamination. So I've read 8 that, and it seemed to be repeated often enough 9 that I came to take it as a fact. 10 And then I received some -- I guess I 11 received some reports from plaintiffs' counsel of 12 some new studies carried out more recently in 13 the -- by Longo and his team, and some others, put 14 in question whether asbestos fibers were present 15 in talcum powder products. And so this caused me 16 to revisit that whole thing. 17 My opinions offered in 2016, '17, about 18 talc and ovarian cancer were premised on the 19 assumption that whereas there may have been some 20 contamination up to the 1970s, it was basically a 21 nonissue after the 1970s. So the opinions I 22 expressed in -- in 2016, '17, were independent of 23 any hypotheses about asbestos in talc. 24 When I saw the reports from Longo and 25 maybe others in the fall -- I think it was in the</p>

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<p style="text-align: right;">Page 98</p> <p>1 fall of 2018, I specifically asked counsel to 2 provide me with other information that they had, 3 and I made a point of saying, you know, Are there 4 studies that contradict these -- is there evidence 5 that contradicts these evidence -- these claims of 6 asbestos contamination? And they sent me some 7 material at that point. 8 Q Okay. The work that Dr. Longo had 9 conducted with respect to analyzing talcum powder 10 products, to your knowledge, has that ever been 11 published? 12 A I'm not sure. I -- to my knowledge, no, 13 but maybe it has been. I don't know. 14 Q Okay. What were you -- when you 15 referred to the study that Dr. Longo conducted, 16 what -- are you referring to the work that he has 17 done in connection with litigation on behalf of 18 plaintiffs' counsel? 19 A I'm referring to a few reports that I 20 think are dated or -- not -- 2017, 2018. I guess 21 they're connected to litigation, but I'm -- I'm 22 not absolutely certain of that. But those are -- 23 that's what I'm referring to. 24 Q Separate and apart from your role as an 25 expert witness, when you're evaluating a</p>	<p style="text-align: right;">Page 100</p> <p>1 of the investigators. I know many of the people 2 in the area that I work in, and I can -- often 3 have a gut feeling about the quality of their 4 work. 5 Q Do you know anything about Dr. Longo's 6 qualifications such that you could render an 7 opinion about the quality of his work? 8 A It's in a different area than mine, so 9 the answer is I -- I couldn't render an opinion 10 about it. 11 Q When you asked for evidence that might 12 contradict the work that Dr. Longo had done in 13 connection with litigation, what specifically were 14 you provided by plaintiffs' counsel? 15 A I'm sorry, without digging around and 16 looking at e-mail exchanges, offhand I can't tell 17 you. I was provided with a batch of -- of 18 documents. I can't remember how many were on one 19 side or the other side. I remember there -- well, 20 in my report I refer to a few pieces of evidence 21 that -- yes. So -- can I -- well, on page 30 in 22 my copy -- 23 Q Okay. 24 MS. PARFITT: Why don't you give the 25 category, the title.</p>
<p style="text-align: right;">Page 99</p> <p>1 scientific question, do you typically consult 2 expert reports that are generated for purposes of 3 litigation? 4 MS. PARFITT: Objection. Form. 5 THE WITNESS: I would -- if I had 6 access -- I mean, usually we don't know about such 7 reports if we're not in the litigation process. 8 So it's a hypothetical question, I guess. It -- 9 it just doesn't come up in reality that I would be 10 looking at carcinogenicity of diesel engine 11 emissions, and I would have access to reports 12 produced in litigation that are not published. 13 I -- I don't know that I -- I wouldn't have access 14 to such information unless I was part of the 15 litigation. But... 16 BY MS. BRANSCOME: 17 Q Okay. When you're evaluating scientific 18 literature, do you place a different amount of 19 weight on a study that has been peer reviewed as 20 compared to one that has not? 21 A Yes, it's one of the considerations. 22 Q Okay. And -- 23 A There -- there are many considerations 24 that I weigh, including my knowledge of and 25 evaluation of the skill and reputation and quality</p>	<p style="text-align: right;">Page 101</p> <p>1 THE WITNESS: Oh, the -- so it's in 2 Section 5.3.2, "What were women exposed to in body 3 powders?" 4 BY MS. BRANSCOME: 5 Q Were you provided, for example, with the 6 expert reports generated by the expert retained by 7 Johnson & Johnson and Imerys to rebut Dr. Longo's 8 report? 9 A Can you give me the author's name or -- 10 Q Sure. Were you provided any reports by 11 Dr. Matthew Sanchez? 12 A I don't recall. I don't recall that. 13 Q Are you offering an expert opinion about 14 the contents of any of the talcum powder products 15 sold or manufactured by Johnson & Johnson? 16 A I only take note of what has been 17 provided in the various documents I have access 18 to. 19 Q What does that mean? 20 A It means -- can I read the sentence? 21 Basically, I think it summarizes what I mean. And 22 I'll start -- so I'll start on the sentence that 23 on my copy is on the bottom of page 29, still in 24 that Section 5.3.2. 25 "So representatives of the industry have</p>

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<p>1 claimed that talcum powders were free of asbestos</p> <p>2 fibers since the 1980s" -- and there are a couple</p> <p>3 of references there --</p> <p>4 MS. PARFITT: Read them.</p> <p>5 THE WITNESS: "Hopkins 2018, Pier 2018.</p> <p>6 -- "but this assertion has increasingly</p> <p>7 come under doubt as a number of labs have reported</p> <p>8 finding asbestos fibers in talcum powder</p> <p>9 products." And it references Blount, '91;</p> <p>10 Paoletti, '84; Gordon, 2014; Longo, et al., 2017</p> <p>11 and 2018; Blount deposition, 2018; Pier</p> <p>12 deposition, 2018.</p> <p>13 "These various studies that have</p> <p>14 reported finding asbestos in historic talcum</p> <p>15 powder samples have been challenged by other</p> <p>16 reports that failed to find meaningful amounts of</p> <p>17 asbestos in historic talcum powder samples." And</p> <p>18 the two citations are CIR 2013 and Anderson 2017.</p> <p>19 BY MS. BRANSCOME:</p> <p>20 Q So what I'm trying to understand,</p> <p>21 Dr. Siemiatycki, is what role this information</p> <p>22 plays in your opinions, if any.</p> <p>23 A Not much. You know, I would say that</p> <p>24 the -- my opinions about the association are</p> <p>25 driven by the strength and consistency of the</p>	<p>1 and answered.</p> <p>2 THE WITNESS: You know, I would say the</p> <p>3 sentences that I read summarize my opinion on that</p> <p>4 question.</p> <p>5 BY MS. BRANSCOME:</p> <p>6 Q So in your opinion, is it -- is it a</p> <p>7 question for debate in the scientific community at</p> <p>8 the moment?</p> <p>9 MS. PARFITT: Objection. Form.</p> <p>10 Misstates his testimony.</p> <p>11 THE WITNESS: It's not an area in which</p> <p>12 I feel confident to pronounce that the issue has</p> <p>13 been resolved or not.</p> <p>14 MS. BRANSCOME: Is now a good time for a</p> <p>15 break? I don't now how long --</p> <p>16 MR. TISI: We've been going about an</p> <p>17 hour and 25 minutes.</p> <p>18 MS. PARFITT: We have lunch at 1:00, and</p> <p>19 I don't think it's here.</p> <p>20 (A discussion was held off the record.)</p> <p>21 MS. BRANSCOME: We can go off the</p> <p>22 record.</p> <p>23 THE VIDEOGRAPHER: This ends disc number</p> <p>24 in the deposition of Jack Siemiatycki. We're</p> <p>25 going off the record at 12:42 p.m.</p>
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<p>1 epidemiologic evidence. And this information</p> <p>2 about asbestos contamination of talcum powder</p> <p>3 products would be capable of moving the dial in</p> <p>4 the direction of increasing my belief that there</p> <p>5 is a causal assoc- -- a causal relationship, if it</p> <p>6 is demonstrated that there were in fact asbestos</p> <p>7 fibers contaminating.</p> <p>8 So if it is shown that they are present,</p> <p>9 that would increase my level of belief. If it is</p> <p>10 not shown, if it is not demonstrated, it would not</p> <p>11 detract from my finding based on the epidemiologic</p> <p>12 evidence. It could move the dial in one</p> <p>13 direction. It wouldn't move the dial in another,</p> <p>14 because there -- there are different conceivable</p> <p>15 ways that talcum powder products could increase</p> <p>16 the risk of ovarian cancer. This is one. I'm not</p> <p>17 capable of adjudicating whether this one is</p> <p>18 correct or not.</p> <p>19 Q So as you sit here today,</p> <p>20 Dr. Siemiatycki, do you have an opinion to a</p> <p>21 reasonable degree of scientific certainty that</p> <p>22 there are in fact contaminants like asbestos or</p> <p>23 heavy metals in Johnson & Johnson's talcum powder</p> <p>24 products?</p> <p>25 MS. PARFITT: Objection. Form. Asked</p>	<p>1 (Lunch recess.)</p> <p>2 THE VIDEOGRAPHER: This begins disc</p> <p>3 number 3 in the deposition of Jack Siemiatycki.</p> <p>4 We're going back on the record at 1:46 p.m.</p> <p>5 BY MS. BRANSCOME:</p> <p>6 Q Good afternoon, Dr. Siemiatycki.</p> <p>7 Did you have a chance to look at the</p> <p>8 various subjects we were going to return to after</p> <p>9 the lunch break?</p> <p>10 A I did.</p> <p>11 Q Okay. So we'll take them one at a time.</p> <p>12 A Yes, please.</p> <p>13 Q Let's start first with, did you identify</p> <p>14 the document that you had been provided by</p> <p>15 plaintiffs' counsel that you said you took out all</p> <p>16 but about 20 pages that you found relevant?</p> <p>17 A Right. So I -- I think I mentioned the</p> <p>18 IARC monographs as being two of them, and I think</p> <p>19 the third one was the Reference Manual on</p> <p>20 Scientific Evidence. There was a huge pack of</p> <p>21 pages that were sent to me, and I took out most of</p> <p>22 them, but I retained some that I thought were</p> <p>23 relevant.</p> <p>24 Q What portions of the Reference Manual on</p> <p>25 Scientific Evidence did you retain?</p>

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<p>1 A I think it was the Epidemiology section 2 and maybe the Statistics section. 3 Q All right. During the break, you were 4 also going to check which of the epidemiological 5 studies that you included in your meta-analysis. 6 Did you or someone at your direction 7 independently calculate an odds ratio or relative 8 risk figure that was not published in the report 9 itself? 10 A Sorry, what? That was not published in 11 the original report. So I'm not sure. The answer 12 is in the time I had available, I couldn't really 13 identify anything like that, and I'm not sure if 14 that occurred at all, and it -- the impact of 15 that, if -- if it had occurred, would have been 16 negligible. 17 Q If -- 18 A It would have meant -- I'm sorry. It 19 would have meant that most likely I added -- I put 20 together a two-by-two table by aggregating across 21 two or three or four levels of exposure. If -- if 22 it had happened, I think that's what would have 23 happened. And the impact of that would be to 24 produce an odds ratio estimate that is not 25 adjusted for the covariates that they adjusted for</p>	<p>1 think what it is, we've got the signature page on 2 the one report, and then the one he has in his 3 binder appears to not have a signature page on it, 4 and the font seems to be -- when the signature 5 page was put in, the font was slightly larger, 6 which sort of throws off the page numbers. Same 7 report. 8 MS. BRANSCOME: So what I would -- 9 MS. PARFITT: Single -- 10 MS. BRANSCOME: -- request so that we 11 keep the record clean going forward and not every 12 question has to say page 108 in mine and page 107 13 in your copy is that we actually mark the version 14 of the report that has been produced to us as 15 Exhibit 11 -- well, let me just, Ms. Parfitt, 16 would you be comfortable marking his copy as 17 Exhibit 11 and switching them and putting the new 18 clean copy as Exhibit 10? I'm only thinking that 19 there are many prior questions -- 20 MS. PARFITT: Sure, I'm fine with that. 21 MS. BRANSCOME: -- that refer to his 22 report -- 23 MS. PARFITT: As long as his -- 24 MS. BRANSCOME: -- as Exhibit 10. 25 MS. PARFITT: Yeah, and just so the</p>
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<p>1 in their analysis by the categories of dose or 2 whatever they adjusted for. 3 Q Is there any way by examining your 2018 4 report and the addendum that an outside reader 5 could determine which studies, if any, were 6 subject to this independent calculation? 7 A So the one thing I didn't check during 8 the break was whether there's a note in the 9 addendum, and it would take me a while, I'd have 10 to go through each study and see if there's any 11 notation in the margin that would indicate that 12 this was done. So I -- I -- I'm not sure of the 13 answer to your question. 14 Q If an adjustment like that or an 15 independent calculation had been done, would it be 16 your expectation that a notation would have been 17 made in the addendum? 18 A Yes. Yes. 19 Q All right. Did you look at anything 20 else over the lunch break? 21 A Well, we looked to see -- the page -- 22 pagination discrepancy between the different 23 versions, and I think Ms. Parfitt could fill you 24 in on -- or maybe she has. I don't know. 25 MS. PARFITT: No. No, I haven't. I</p>	<p>1 record is clear, and what appears to have happened 2 is there was a signature page that was put on the 3 report to represent the matter was filed in the 4 United States District Court, the District of New 5 Jersey, in light of the prior report that was in a 6 state court, and that has thrown off not only the 7 page numbers but I think even it might have been a 8 different font. 9 Sure, so we will put on -- 10 THE WITNESS: So do you want to modify 11 the -- this? 12 MS. PARFITT: Sure. I think what we're 13 going to do is the one that Dr. Siemiatycki has 14 brought will be now Exhibit 11, and the one that's 15 in -- on the thumb drive and -- 16 MS. BRANSCOME: It is tab 3 in the 17 binder in front of you will be the correct 18 Exhibit 10. 19 MS. PARFITT: And this will be 20 Exhibit 11. 21 MR. TISI: And Exhibit 11 will be his 22 copy, the one that he brought. 23 MS. PARFITT: And this will be 3 -- 3, 24 correct? 25 MS. BRANSCOME: 11 -- I mean 10. It's</p>

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<p>1 tab 3.</p> <p>2 MS. PARFITT: 11 -- 10. Tab 3, correct.</p> <p>3 (Exhibit No. 11 was marked for</p> <p>4 identification.)</p> <p>5 BY MS. BRANSCOME:</p> <p>6 Q So, Dr. Siemiatycki, can you confirm</p> <p>7 that Exhibit 10 is a complete copy of your report</p> <p>8 that was submitted in the MDL? It is a clean copy</p> <p>9 and does not contain any annotations.</p> <p>10 A Yes.</p> <p>11 Q Can you also confirm that what we have</p> <p>12 now marked as Exhibit 11 is the copy of your MDL</p> <p>13 report that you brought with you here today? It</p> <p>14 does contain handwritten annotations and the page</p> <p>15 numbers are just slightly misaligned.</p> <p>16 A Yes.</p> <p>17 Q Okay. So if you could, in Exhibit --</p> <p>18 oh, there was one other --</p> <p>19 A There was one other, and -- and there's</p> <p>20 another -- yet another one that I -- a correction</p> <p>21 to be made, a small one.</p> <p>22 So do you want to point out what that --</p> <p>23 Q Yes. So, Dr. Siemiatycki, do you have</p> <p>24 any corrections that you would like to make to</p> <p>25 your report at this time?</p>	<p>1 would like to make at this time?</p> <p>2 A Yes. I'd like to make one -- oh, yes.</p> <p>3 Well, page 72 in this version.</p> <p>4 MS. PARFITT: Just refer to the exhibit</p> <p>5 number, so 11.</p> <p>6 THE WITNESS: Exhibit 11, page 72,</p> <p>7 Table 2. Table 2 of the report.</p> <p>8 BY MS. BRANSCOME:</p> <p>9 Q What is the correction you would like to</p> <p>10 make?</p> <p>11 A The correction is -- there's a column</p> <p>12 called "Included in main meta-analysis," and I</p> <p>13 think in your copy, as in mine in this version,</p> <p>14 there are a bunch of question marks. In the</p> <p>15 original Word document that I submitted, these</p> <p>16 were not question marks. They were tick marks,</p> <p>17 checkmarks. And somehow in the translation of</p> <p>18 Word to PDF, this -- the tick mark -- the tick</p> <p>19 marks got changed to these funny little question</p> <p>20 marks. So they should all be tick marks.</p> <p>21 Q Are there any other corrections you</p> <p>22 would like to make to your report?</p> <p>23 A Not that I'm aware of at this time.</p> <p>24 Q Okay. So if you could turn to</p> <p>25 Exhibit 10 -- which is in front of you there -- if</p>
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<p>1 A So the one outstanding one that we had</p> <p>2 highlighted -- or we've gone through the three of</p> <p>3 them.</p> <p>4 MS. PARFITT: 45.</p> <p>5 THE WITNESS: Have we --</p> <p>6 MS. PARFITT: No, 45. Page --</p> <p>7 MR. TISI: No, 47. 45.</p> <p>8 MS. PARFITT: Page 45. Excuse me, it's</p> <p>9 47.</p> <p>10 THE WITNESS: Oh, yes, that -- the</p> <p>11 question of whether that sentence should refer to</p> <p>12 Berge or Terry on that page. It's Berge 2018, not</p> <p>13 Terry. I was right the first time.</p> <p>14 MS. PARFITT: Oh, and it is page 45,</p> <p>15 just for the record. It is not 47. That was the</p> <p>16 first correction is on page 45.</p> <p>17 THE WITNESS: In this version.</p> <p>18 BY MS. BRANSCOME:</p> <p>19 Q So just to be clear, Dr. Siemiatycki, on</p> <p>20 the third line of page 45 of Exhibit 10, the</p> <p>21 reference to Terry 2013 in the sentence beginning</p> <p>22 with the word "while" should in fact be Berge</p> <p>23 2018?</p> <p>24 A Yes.</p> <p>25 Q Do you have any other corrections you</p>	<p>1 you could turn to your Conclusion section. It</p> <p>2 should be on page 69.</p> <p>3 A Yes.</p> <p>4 Q You state in the second paragraph below</p> <p>5 the Conclusion section that: "Based on the</p> <p>6 totality of the evidence, it is my opinion to a</p> <p>7 reasonable degree of scientific certainty that the</p> <p>8 perineal use of talcum powder products can cause</p> <p>9 ovarian cancer."</p> <p>10 First, did I read that correctly?</p> <p>11 A Yes, you did.</p> <p>12 Q Does that conclusion accurately</p> <p>13 summarize your opinion in this case as to whether</p> <p>14 or not perineal use of talcum powder can cause</p> <p>15 ovarian cancer?</p> <p>16 A Yes, it does.</p> <p>17 Q You state that your opinion is to a</p> <p>18 reasonable degree of scientific certainty,</p> <p>19 correct?</p> <p>20 A Correct.</p> <p>21 Q Is that a phrase that you have ever used</p> <p>22 in a scientific publication?</p> <p>23 A I don't think so.</p> <p>24 Q Why did you use it here?</p> <p>25 A I've seen this phrase used in all of the</p>

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<p style="text-align: right;">Page 114</p> <p>1 expert opinions in the legal cases that I've seen, 2 and I inferred that it's a -- a formula that is 3 de rigueur in legal communications for this sort 4 of thing. 5 Q When you say "to a reasonable degree of 6 scientific certainty," what do you mean by that 7 phrase? 8 A So my -- you know, I think somewhere 9 else in the document, I -- I phrase it in a way 10 that I'm comfortable with, which is a way that 11 also is sort of derivative from my understanding 12 of legal jargon and precedence. I think that it's 13 more likely than not that there is a causal 14 relationship. 15 Q You anticipated where I was going with 16 my question. Do those two sentences mean anything 17 different to you? 18 A No. 19 Q What is your understanding of "more 20 likely than not"? 21 A From a strictly mathematical point of 22 view, it implies that I feel that there's greater 23 than 50 percent probability that this thesis is 24 true. And I wouldn't put a more quantitative 25 meaning onto it.</p>	<p style="text-align: right;">Page 116</p> <p>1 that exists today enable a scientist to parse that 2 out? 3 MS. PARFITT: Objection. Form. 4 THE WITNESS: I'm not sure I understand 5 the premise of the question, the "if" part. 6 BY MS. BRANSCOME: 7 Q Okay. So if the biological mechanism by 8 which a talcum powder product can cause ovarian 9 cancer is because of a particular contaminant in 10 that talcum powder product, but that contaminant 11 does not exist in all talcum powder products, 12 would the epidemiological evidence that exists 13 today allow you to see that distinction? 14 MS. PARFITT: Objection. Form. 15 THE WITNESS: The epidemiologic evidence 16 as -- as it exists today would not allow one to 17 parse out anything about the particular 18 manufacturer, the particular product, if I 19 understand your question correctly. 20 BY MS. BRANSCOME: 21 Q And so therefore, the epidemiological 22 evidence as it exists today does not have a level 23 of detail by which someone reviewing that data 24 could determine if there were different 25 contaminants present in different talcum powder</p>
<p style="text-align: right;">Page 115</p> <p>1 Q Is your opinion that perineal use of 2 talcum powder products can cause ovarian cancer, 3 is it specific to a single brand or manufacturer 4 of talcum powder? 5 A No, it isn't. 6 Q Why not? 7 A Because as I understand it, the 8 epidemiologic evidence that supports the thesis of 9 a causal relationship is derived from evidence 10 among women who used all types of talcum powder 11 products that were available in their consumer 12 area of purchase of these products. And whatever 13 was the frequency distribution of different 14 manufacturers and types of powdering that were 15 available in the consumer -- various consumer 16 markets were the types that lead to the overall 17 inference about causality, and there's no way for 18 me to parse out which particular manufacturer 19 would have been more or less responsible for any 20 of this. 21 Q If in fact, and we're just talking 22 hypothetically, the biological mechanism by which 23 some talcum powder products can cause ovarian 24 cancer is related to a contaminant in that talcum 25 powder product, does the epidemiological evidence</p>	<p style="text-align: right;">Page 117</p> <p>1 products that were used by individuals who 2 developed ovarian cancer -- 3 MS. PARFITT: Objection. Form. 4 BY MS. BRANSCOME: 5 Q -- correct? 6 MS. PARFITT: Objection. Form. 7 THE WITNESS: May I read the -- 8 MS. PARFITT: Yes, you can. 9 BY MS. BRANSCOME: 10 Q Of course. 11 A Just to make sure I understand. 12 (Peruses document.) 13 So I -- I don't think that the 14 epidemiological evidence would allow you to 15 attribute causality to a specific type or -- or 16 not. If one knew -- if part of your hypothetical 17 is the knowledge of what the constituents were of 18 different products used in different markets, and 19 the biological mechanism has been established to a 20 high degree of certainty, there might be some room 21 for making inferences about this. But that seems 22 like a tenuous possibility. 23 Q But you agree that the current 24 epidemiological evidence as it exists does not 25 enable someone to distinguish between brands of</p>

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<p style="text-align: right;">Page 118</p> <p>1 cosmetic talc products, for example? 2 MS. PARFITT: Objection. Form. 3 THE WITNESS: I don't think it does. 4 BY MS. BRANSCOME: 5 Q Does -- is your opinion that perineal 6 use of talcum powder products can cause ovarian 7 cancer, is that limited to talcum powder products 8 manufactured during a certain time period? 9 A The evidence as it exists today pertains 10 to products manufactured over half a century, 11 roughly speaking, so I don't think that there's 12 any way to link it to products manufactured in a 13 particular time period. 14 In -- in answer to that question, 15 actually, and to the previous one, hypothetically, 16 one might imagine looking at the different 17 study -- the 30-odd studies that have been carried 18 out in different communities and different cities 19 and different countries, and if one could obtain 20 reliable, reasonably precise and time relevant 21 information on market shares of products in 22 different markets at different times, that could 23 give a first approximation of whether certain 24 company products are more closely linked to the 25 excesses that are seen in the epidemiological</p>	<p style="text-align: right;">Page 120</p> <p>1 ovarian cancer in that area, it would be 2 improbable that the product of that company were 3 not part of the responsibility, but one of the 4 companies that produced 5 or 10 percent of the 5 market share. 6 BY MS. BRANSCOME: 7 Q Okay. But as you sit here today, based 8 on the analysis that you have done, you are not 9 able to draw an opinion specifically about an 10 increased risk of ovarian cancer that is tied to a 11 particular brand or a particular time period, 12 correct? 13 MS. PARFITT: Objection. Form. 14 THE WITNESS: That's correct, in part 15 because I don't have data on market share at 16 different times and in different places. 17 BY MS. BRANSCOME: 18 Q Okay. In forming your opinion that 19 perineal talc use can cause ovarian cancer, did 20 you reach an opinion about how much talcum powder 21 is needed to cause ovarian cancer? 22 A No. 23 Q Is there an amount of talcum powder that 24 can be used perineally without increasing a risk 25 for ovarian cancer?</p>
<p style="text-align: right;">Page 119</p> <p>1 studies. 2 Q The application, though, of a market 3 share analysis to the users of talcum powder 4 products, if you're looking at causality, would 5 require that the individuals who developed ovarian 6 cancer had purchased their talcum powder according 7 to the market share, correct? 8 MS. PARFITT: Objection. Form. 9 THE WITNESS: Approximately, yes. 10 BY MS. BRANSCOME: 11 Q So, for example, if one type of talcum 12 powder product or one time period of talcum powder 13 product is the only type that actually causes 14 ovarian cancer, so all of the positives were 15 derived from those users, you -- you could not 16 determine that simply by applying market share, 17 for example? 18 MS. PARFITT: Objection. Form. 19 THE WITNESS: That -- that's true, 20 except in the circumstance that market share were 21 very, very high in most of the communities that 22 have been investigated. So if one company 23 produced 90 percent or 85 percent or something of 24 the product in a certain area -- that was consumed 25 in a certain area, and there's an excess risk of</p>	<p style="text-align: right;">Page 121</p> <p>1 A So let me go back to the previous 2 question, and clarify what do you mean by amount? 3 Do you mean like the amount in grams? The amount 4 in number of applications? The amount in number 5 of day -- days on which the powder is applied? 6 These are all different metrics of exposure, and 7 the answer might depend on what kind of -- you 8 know, we're starting with these studies. There 9 are now some hints about the dose-response 10 relationship and what kind of levels of exposure 11 in terms of number of applications in use, 12 observable excess risks. 13 Q So let me ask it this way: Did you 14 calculate how much talcum powder is needed to 15 cause ovarian cancer in any of the forms, be it 16 frequency of application, the amount in grams that 17 was used? 18 A I -- 19 MS. PARFITT: Objection. Form. 20 THE WITNESS: I did not carry out such a 21 calculation. I'm -- my emphasis was on 22 determining whether there's a dose-response 23 relationship. Going beyond that might involve 24 trying to quantify the dose-response relationship 25 to the extent of determining what the shape of</p>

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<p style="text-align: right;">Page 122</p> <p>1 such a relationship is and how the curve looks, 2 whether there's a threshold effect, and so on. 3 But I don't think there's enough data now to be 4 able to make such estimates. 5 BY MS. BRANSCOME: 6 Q Can you rule out the possibility that 7 there is a threshold below which perineal use of 8 talc presents no risk of ovary -- of ovarian 9 cancer? 10 MS. PARFITT: Objection. Form. 11 THE WITNESS: No, I -- I don't think -- 12 I can't, and I don't think it's possible to do 13 that with most carcinogens. It's -- it's an 14 extremely difficult and controversial issue of how 15 to detect sort of a minimum level of exposure 16 produces a carcinogenic effect. 17 BY MS. BRANSCOME: 18 Q In your view, has a dose-response 19 relationship for the perineal application of talc 20 and the development of ovarian cancer been 21 established in the scientific literature? 22 A My view is that the data are certainly 23 compatible with the notion of a dose-response 24 relationship. It -- it trends in that direction 25 of that conclusion. It's not definitive yet.</p>	<p style="text-align: right;">Page 124</p> <p>1 ovarian cancer, is that the question? Almost. 2 But the one qualification I would make in 3 answering that question is that I have a colleague 4 who started working with -- in my academic 5 department about 12 years ago, and she was 6 interested in ovarian cancer as a topic of 7 research, and she wanted to organize a case- 8 control study of ovarian cancer in relation to 9 various factors, and she asked me to kind of 10 mentor her -- she was just starting out -- mentor 11 her in getting grants, in setting up the study, 12 and this sort of thing, and this is what I did 13 with her. 14 So I worked on grant applications with 15 her on some aspects of setting up her study, and 16 that has been going on now for -- I don't know -- 17 I think since 2010 maybe that she started. So -- 18 but that has not -- I've been what we call a 19 coinvestigator on that project, not a principal 20 investigator. 21 But apart from that, the next stage in 22 my involvement with talc and ovarian cancer was in 23 the litigation. 24 Q What is your colleague's name? 25 A Anita Koushik.</p>
<p style="text-align: right;">Page 123</p> <p>1 It's not definitive. But I believe the bulk of 2 the evidence, especially from the Terry study and 3 partly from, I think it's the, Schildkraut study, 4 which are the most powerful ones for that 5 question, but certainly the Terry study is by far 6 the most important one, does tend to indicate 7 dose-response relationship. 8 Q Is the data that exists today also 9 compatible with no dose-response relationship? 10 MS. PARFITT: Objection. Form. 11 THE WITNESS: Yes. It could be -- in 12 other words, it could be a chance finding. Is -- 13 that's what you're saying. I think it's unlikely, 14 but it's -- it can't be ruled out. 15 BY MS. BRANSCOME: 16 Q Are you offering an expert opinion that 17 the inhalation of talc increases or presents any 18 risk of ovarian cancer? 19 A I -- I don't have an opinion on -- on 20 that. No. 21 Q Aside from your participation in the 22 IARC panel in 2006 and the Langseth article on 23 2008, has all of your work on talc and ovarian 24 cancer been in connection with litigation? 25 A On talc and -- sorry, work on talc and</p>	<p style="text-align: right;">Page 125</p> <p>1 Q If you had to give me your best 2 estimate, how many hours total have you spent 3 assisting her with the case-control study? 4 MS. PARFITT: Objection. Form, 5 misstates his testimony. 6 THE WITNESS: It's very hard to answer 7 that. I mean, ten years ago discussions over 8 coffee about studies and how to write grant 9 applications and reviewing and revising and so on. 10 I -- I don't -- not a trivial amount and not an 11 overwhelming amount. 12 BY MS. BRANSCOME: 13 Q When was the last time that you spent 14 hours in connection with that case-control study? 15 MS. PARFITT: Objection. Form. 16 THE WITNESS: There was a manuscript 17 that came -- a publication that came from that 18 study. It was -- the study was only completed in 19 the field, the data collection, around two years 20 ago, and spending a year cleaning data and so on, 21 and then starting to analyze it. 22 And there was an analysis of 23 reproductive and hormonal factors in relation to 24 ovarian cancer, and I helped her review and revise 25 that manuscript. That would have been a year and</p>

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<p>1 a half ago or so, and I don't know, maybe I spent 2 three or four days on it at the time. 3 BY MS. BRANSCOME: 4 Q Did that study reach any conclusions 5 with respect to a potential link between perineal 6 use of talc and ovarian cancer? 7 A The talc information was collected in 8 the questionnaire and has not yet been analyzed. 9 Q Other than what we just discussed with 10 respect to the case-control study and then your 11 work in connection with the IARC panel and the 12 Langseth paper, have you ever done any original 13 research on the association between perineal 14 talcum powder use and ovarian cancer? 15 A No. No, I haven't. 16 It's common -- it's common for me to be 17 asked to review information on which I have not 18 directly worked. You know, topics. You know, I 19 recently was asked by the government of France to 20 evaluate a problem of possible cancer risks 21 related to a pesticide that's used in the banana 22 industry in Guadeloupe and Martinique. I've never 23 studied that pesticide and I've never been to 24 Martinique. But the kind of expertise that I have 25 can be applied to studying different sorts of</p>	<p>1 A That's correct. 2 Q Have you done anything since 2016 to 3 publicly announce your view that the perineal use 4 of talc can cause ovarian cancer? 5 A No, I've not had really an opportunity. 6 And in a way the -- the publication by Berge, 7 which appeared as a -- after I completed my 8 meta-analyses, and they -- they kind of beat me to 9 the punch with one type of publication output that 10 I might have produced. So I'm thinking about 11 different ways of communicating my results and my 12 opinions, but mainly my results. 13 I mean, the other part of the answer 14 to -- another part of the answer to your question 15 is that I'm not particularly a fan of individual 16 scientists going into press with opinions before 17 some sort of consensus starts to appear. I mean, 18 you can -- you can publish hypotheses and ideas, 19 but proclaiming conclusions is something that 20 should come later in the scientific process. I 21 mean, I -- I think it's best if IARC or an agency 22 like IARC would take on that role, and that would 23 be my hope actually. 24 Q In your opinion, has consensus formed 25 that peri- -- perineal use of talc can cause</p>
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<p>1 problems. 2 Q You have not published the meta-analyses 3 that you -- meta-analysis you performed in 4 connection with the MDL, have you? 5 A No, I haven't. 6 Q Have you ever published in any peer- 7 reviewed article the opinion that the perineal use 8 of talcum powder can cause ovarian cancer? 9 A I -- I've never had occasion to opine 10 about this in any publication, and one doesn't 11 just announce to the New England Journal of 12 Medicine that you want to, you know, write an 13 article about opining about something like this. 14 There has to be some sort of platform basis of 15 research evaluation and so on. 16 And my involvement in this case might 17 lead to such a publication, but in the past I 18 would have not -- I had no reason to publish or to 19 try to publish such an opinion. 20 Q But you had formed an opinion with 21 respect to the perineal use of talcum powder and 22 an increased risk of ovarian cancer at the time 23 that you published your report in October of 2016. 24 And by "published," I mean within the 25 litigation context, correct?</p>	<p>1 ovarian cancer? 2 A I think among people who have reviewed 3 the evidence who -- sort of competent scientists 4 who have reviewed the evidence, I think there's 5 starting to be a ground swell of consensus about 6 it. You know, I've never done a survey, so I 7 can't say if it's majority or minority. 8 If your denominator is all medical 9 researchers, then the answer is, well, most of 10 them have never heard of this issue, so it's 11 not -- they wouldn't be susceptible to holding 12 such an opinion. But among the people who have 13 reviewed, are familiar with the issues, I think 14 there's certainly a much higher level of 15 receptivity to this thesis than there was ten 16 years ago. 17 Q Has a consensus been reached that 18 perineal use of talc probably causes ovarian 19 cancer? 20 MS. PARFITT: Objection. Asked and 21 answered. Form. 22 THE WITNESS: I can't answer that 23 question. I -- it's too -- are you trying to make 24 the distinction between probably and -- I -- so -- 25 BY MS. BRANSCOME:</p>

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<p>1 Q Well, what do you understand the phrase</p> <p>2 "can cause ovarian cancer" to mean?</p> <p>3 A Well, it's a synonym with "is a risk</p> <p>4 factor for" or -- that's how I understand it.</p> <p>5 Q All right. And is that in your mind the</p> <p>6 same as "it probably causes cancer"?</p> <p>7 MS. PARFITT: Objection. Form.</p> <p>8 THE WITNESS: "It probably can cause,"</p> <p>9 is that what you said, or "probably does cause"?</p> <p>10 BY MS. BRANSCOME:</p> <p>11 Q Probably does cause.</p> <p>12 A So I don't think any risk factor can be</p> <p>13 described as -- in a way with the wording "does</p> <p>14 cause." You know, smoking does not cause lung</p> <p>15 cancer. It can cause lung cancer when there's a</p> <p>16 constellation of other favorable circumstances.</p> <p>17 You know, this is part of multifactorial causation</p> <p>18 of disease. So, you know, each factor in itself</p> <p>19 is not the cause, but it's part of a constellation</p> <p>20 of factors that together can cause the disease.</p> <p>21 So each of them can cause the disease.</p> <p>22 Q So -- you -- you state in your report</p> <p>23 that -- let me see if I can get the exact</p> <p>24 language.</p> <p>25 And perhaps you can get me there more</p>	<p>1 THE WITNESS: I don't know -- I haven't</p> <p>2 carried out a survey among people. I don't know</p> <p>3 whether a consensus has been reached. I don't</p> <p>4 know what proportion of that community would</p> <p>5 subscribe to this point of view or not.</p> <p>6 BY MS. BRANSCOME:</p> <p>7 Q Okay. Setting aside conducting a survey</p> <p>8 of individuals in the scientific community, would</p> <p>9 you say that the scientific literature reflects a</p> <p>10 consensus that the causal relationship between</p> <p>11 perineal talc powder exposure and ovarian cancer</p> <p>12 is probable?</p> <p>13 MS. PARFITT: Objection. Form.</p> <p>14 THE WITNESS: I think the scientific</p> <p>15 literature supports that conclusion. I'm not sure</p> <p>16 that it reflects it.</p> <p>17 So there's kind of a lag period between</p> <p>18 the production of research findings and the</p> <p>19 consensus -- a consensus building around it and</p> <p>20 being expressed in print. You know, if we take</p> <p>21 sort of the classic smoking and lung cancer</p> <p>22 historical example, evidence was accumulating</p> <p>23 rapidly in the 1950s. There were several studies</p> <p>24 through the 1950s and early 1960s, and it was only</p> <p>25 in 1964, so many years after some of this evidence</p>
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<p>1 quickly. You talk about that now you would give a</p> <p>2 different rating under the IARC standard.</p> <p>3 Ah, here we go. Page 67 in your 2018</p> <p>4 report. You state: "It is now my professional</p> <p>5 opinion based on the totality of the evidence,</p> <p>6 that to a reasonable degree of scientific</p> <p>7 certainty, the causal relationship between</p> <p>8 perineal talc powder exposure and ovarian cancer</p> <p>9 is," quote, "probable."</p> <p>10 Did I read that correctly?</p> <p>11 A You did.</p> <p>12 Q Do you hold that opinion?</p> <p>13 A Yes, I do.</p> <p>14 Q What do you mean when you say a "causal</p> <p>15 relationship between perineal talc powder exposure</p> <p>16 and ovarian cancer is," quote, "probable"?</p> <p>17 A I mean it's more likely than not.</p> <p>18 Q Okay. Has a consensus been reached in</p> <p>19 the scientific community, understanding we're</p> <p>20 looking at those who have an interest in this</p> <p>21 issue, been reached that the causal relationship</p> <p>22 between perineal talc powder and ovarian cancer is</p> <p>23 probable?</p> <p>24 MS. PARFITT: Objection. Form, asked</p> <p>25 and answered.</p>	<p>1 had been published and been accepted by many</p> <p>2 scientists, but rejected by others -- there was</p> <p>3 still controversy around it -- that the Surgeon</p> <p>4 General's report reflected and created a</p> <p>5 consensus.</p> <p>6 BY MS. BRANSCOME:</p> <p>7 Q So in early 2019, are we still in the</p> <p>8 lag period or the period in which the production</p> <p>9 of research findings is still behind consensus</p> <p>10 building in the literature?</p> <p>11 MS. PARFITT: Objection. Form,</p> <p>12 misstates his testimony.</p> <p>13 THE WITNESS: Does that mean I should</p> <p>14 answer or --</p> <p>15 MS. PARFITT: I'm objecting. I said it</p> <p>16 misstates your prior testimony.</p> <p>17 THE WITNESS: Okay. Sorry. Let me read</p> <p>18 the question again. (Peruses monitor.)</p> <p>19 So I can't point to hallmark</p> <p>20 publications analogous to the Surgeon General's</p> <p>21 report for smoking and lung cancer that would</p> <p>22 reflect such a bend in the road kind of general</p> <p>23 perception of the talc ovarian cancer issue. It</p> <p>24 doesn't mean that the evidence isn't there, but</p> <p>25 the process of recognizing and generalizing and so</p>

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<p>1 on is not -- has not been achieved yet.</p> <p>2 BY MS. BRANSCOME:</p> <p>3 Q Okay. Have you ever given a lecture,</p> <p>4 either to students or to other scientists, in</p> <p>5 which you have presented your view that the</p> <p>6 perineal use of talcum powder can cause ovarian</p> <p>7 cancer?</p> <p>8 A I have to my students -- I mean to the</p> <p>9 students in my department. I teach epidemiologic</p> <p>10 methods. I don't teach about ovarian cancer. I</p> <p>11 don't teach about talc. That's not what I'm paid</p> <p>12 to do. I'm paid to teach about the methodology</p> <p>13 and the conduct of -- and the interpretation of</p> <p>14 epidemiologic -- and I've used the talc/ovarian</p> <p>15 cancer as an example and walked my students</p> <p>16 through the evidence. So, yes, I have.</p> <p>17 Q When did you start teaching that as part</p> <p>18 of your epidemiological methods course?</p> <p>19 A Probably two years ago. As soon as I</p> <p>20 started gathering the information and synthesizing</p> <p>21 it, so two -- two or three years ago.</p> <p>22 Q Other than presenting to your students</p> <p>23 your analysis of talc and ovarian cancer as an</p> <p>24 illustration of an epidemiological method, have</p> <p>25 you presented your opinion that perineal use of</p>	<p>1 think. (Peruses document.)</p> <p>2 Q Okay.</p> <p>3 A No, I've never spoken to any of them</p> <p>4 about -- I -- I crossed paths with Dr. Cramer in</p> <p>5 Los Angeles for a -- you know, we were in the same</p> <p>6 hotel. He was leaving, I was coming, that sort of</p> <p>7 thing, but I don't think we had any substantive</p> <p>8 discussion, and I can't -- I know some of the</p> <p>9 others, but I've never spoken to them about this</p> <p>10 issue.</p> <p>11 Q Do you know personally or professionally</p> <p>12 any of the other plaintiffs' experts in the MDL?</p> <p>13 A No, I don't.</p> <p>14 Q You were chair of the working group --</p> <p>15 the IARC Working Group that published the</p> <p>16 monograph on talc in 2006 -- or, well, that met in</p> <p>17 2006, and then was subsequently published in 2010,</p> <p>18 correct?</p> <p>19 A That's correct.</p> <p>20 Q And there were roughly 20 members of</p> <p>21 that working group?</p> <p>22 A I think so.</p> <p>23 Q In 2006, you agreed with the IARC</p> <p>24 classification of, quote, "possible" describing</p> <p>25 the relationship between perineal talc use and</p>
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<p>1 talcum powder can cause ovarian cancer in any</p> <p>2 other context outside of litigation?</p> <p>3 A No, I haven't.</p> <p>4 Q Have you spoken with other scientists</p> <p>5 about the issue of whether perineal use of talcum</p> <p>6 powder can cause ovarian cancer? Setting aside</p> <p>7 your students.</p> <p>8 A Yeah. Yes, I've spoken to -- to</p> <p>9 colleagues, friends over -- over coffee, over</p> <p>10 drinks at conferences, you know, what are you up</p> <p>11 to, what are you doing, and then describe my</p> <p>12 involvement in this case. And then we dig a</p> <p>13 little further into, Well, what -- what do you</p> <p>14 think, and so on. So I -- I have discussed it in</p> <p>15 that kind of format.</p> <p>16 Q Have you ever spoken with any of the</p> <p>17 authors on any of the papers that you cite in your</p> <p>18 report about the potential link between perineal</p> <p>19 use of talc and ovarian cancer?</p> <p>20 A I don't think so. I can quickly scroll</p> <p>21 through the list to see if anything jogs my --</p> <p>22 yeah -- no, let me --</p> <p>23 Q If you can do that quickly, we could do</p> <p>24 it now, or we can save that for the next break.</p> <p>25 A It will take just three minutes, I</p>	<p>1 ovarian cancer, correct?</p> <p>2 MS. PARFITT: Objection. Form.</p> <p>3 THE WITNESS: That's correct. I could</p> <p>4 read the exact wording of what "to be" means, but</p> <p>5 that's the gist of it.</p> <p>6 BY MS. BRANSCOME:</p> <p>7 Q Okay. IARC has not changed its</p> <p>8 clarification of talc, and specifically with</p> <p>9 respect to the peri- -- perineal use of talc since</p> <p>10 it published the 2010 monograph, correct?</p> <p>11 A Technically correct, but actually,</p> <p>12 what -- the correct statement is IARC has not</p> <p>13 evaluated talc since 2006 -- has not reevaluated.</p> <p>14 So there are no changes made to IARC evaluations</p> <p>15 except through a formal complete reevaluation, and</p> <p>16 there has not been a formal complete reevaluation</p> <p>17 of talc since the 2006 meeting. So there's no</p> <p>18 opportunity for IARC to change anything in one</p> <p>19 direction or another failing another complete</p> <p>20 evaluation.</p> <p>21 Q What, if you know, can initiate a formal</p> <p>22 complete evaluation of a constituent like talc?</p> <p>23 A Well, it comes I think from different</p> <p>24 sources. I'm not entirely certain. I know that</p> <p>25 there is now a public process whereby public</p>

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<p>1 parties can write to the monograph program and</p> <p>2 make suggestions for chemicals to be evaluated.</p> <p>3 There are -- they get requests from governments.</p> <p>4 They get requests from groups of scientists. They</p> <p>5 have their own internal scientific staff that has</p> <p>6 its antenna out for different problems that arise,</p> <p>7 and they generally have sort of a five-year</p> <p>8 program of agents that they are going to evaluate</p> <p>9 in every -- in the next five-year period.</p> <p>10 These things are not quick and easy to</p> <p>11 organize, and so there's a lot of lead time.</p> <p>12 There's a lot of, in a way, competition for agents</p> <p>13 to get onto the list to be evaluated. There are a</p> <p>14 lot of interested parties that would like the</p> <p>15 agent that they are exposed to or the "et cetera"</p> <p>16 to be evaluated. So the exact mechanics of how</p> <p>17 they make decisions, I haven't been involved in</p> <p>18 that process, but that's, roughly speaking, how</p> <p>19 it's done.</p> <p>20 Q Have you ever submitted a request to</p> <p>21 IARC for them to conduct a complete evaluation of</p> <p>22 talc?</p> <p>23 A Have I ever?</p> <p>24 Q Have you since the publication of the</p> <p>25 monograph in 2010 submitted a request to IARC for</p>	<p>1 sentence -- you know, in the context of a</p> <p>2 conversation about many things, as we do when we</p> <p>3 catch up when we meet. What -- you know, what's</p> <p>4 on the agenda for the monograph program? By the</p> <p>5 way, I think talc might be an interesting thing to</p> <p>6 put on a list for you to consider. And probably</p> <p>7 the conversation ended -- that part of the</p> <p>8 conversation ended and moved on to other things.</p> <p>9 But...</p> <p>10 MR. KLATT: Should we take a break?</p> <p>11 MS. BRANSCOME: I understand the noise,</p> <p>12 but I -- I don't know that Dr. Siemiatycki was</p> <p>13 finished with his answer.</p> <p>14 MS. PARFITT: We'll keep going. I</p> <p>15 didn't -- I was trying to keep a clean record for</p> <p>16 you. That's fine. Keep going.</p> <p>17 MS. BRANSCOME: Well, we -- we can</p> <p>18 pause. I just was trying to let him finish his</p> <p>19 answer.</p> <p>20 MS. PARFITT: We'll keep it paused here</p> <p>21 on the screen. Just a little bit more activity.</p> <p>22 THE VIDEOGRAPHER: We will pause for a</p> <p>23 second. We're going off the record, 2:41 a.m. --</p> <p>24 p.m.</p> <p>25 (Pause.)</p>
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<p>1 them to conduct another complete evaluation of</p> <p>2 talc?</p> <p>3 A I had a quick word with the director of</p> <p>4 the monograph program a few months ago, and I</p> <p>5 suggested it might be time for that. But I'm</p> <p>6 intending to submit a more formal request along</p> <p>7 those lines. So...</p> <p>8 Q Okay. Who -- who specifically did you</p> <p>9 speak with a few months ago?</p> <p>10 A The director of the monograph program is</p> <p>11 Kurt Straif, S-T-R-A-I-F.</p> <p>12 Q And how did you have occasion to be</p> <p>13 speaking with the director?</p> <p>14 A We're acquaintances, and I met him at a</p> <p>15 conference in August, I saw him when I was in Lyon</p> <p>16 in November at a meeting that he organized. So</p> <p>17 I've seen him a few times in the last six months.</p> <p>18 Q When did you have this conversation with</p> <p>19 the director?</p> <p>20 A I think it was in the summer.</p> <p>21 Q So the summer of 2018?</p> <p>22 A Yeah.</p> <p>23 Q And what specifically did you discuss</p> <p>24 with him?</p> <p>25 A I -- I think it might have been a one</p>	<p>1 THE VIDEOGRAPHER: We're going back on</p> <p>2 the record at 2:43 p.m.</p> <p>3 BY MS. BRANSCOME:</p> <p>4 Q When you spoke with the director of the</p> <p>5 monograph program for IARC last summer, did you</p> <p>6 inform him that you have been serving as an expert</p> <p>7 witness on behalf of plaintiffs in litigation</p> <p>8 involving talcum powder products and the claim</p> <p>9 that they cause ovarian cancer?</p> <p>10 A I'm not sure if I told him at that time,</p> <p>11 but I certainly have told him since then.</p> <p>12 Q When you were talking to him about the</p> <p>13 possibility of including talc in a formal,</p> <p>14 complete evaluation subsequent to the one that was</p> <p>15 done in 2006 and published in 2010, did you tell</p> <p>16 him anything about your opinions with respect to</p> <p>17 the likelihood that perineal use of talc can cause</p> <p>18 ovarian cancer?</p> <p>19 A I don't think I did.</p> <p>20 Q What did he say about -- if anything,</p> <p>21 about conducting a formal evaluation of talc?</p> <p>22 A I -- I can't remember if he said</p> <p>23 anything about it.</p> <p>24 Q Have you had any conversations with him</p> <p>25 other than the conversation you had last summer</p>

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<p>1 about IARC conducting another examination of talc</p> <p>2 and its potential carcino- -- carcinogenicity --</p> <p>3 whoops, butchered that one -- about it's ability</p> <p>4 to cause cancer?</p> <p>5 A No. I don't think I did.</p> <p>6 Q Now, you said you have an -- you have</p> <p>7 the intention to submit something formal to IARC;</p> <p>8 is that correct?</p> <p>9 A Yes. I've been thinking about it, and</p> <p>10 I -- when I have time, I'll look into the process.</p> <p>11 Q What specifically would you request that</p> <p>12 IARC do at this time with respect to talc?</p> <p>13 A Carry out an evaluation like they did in</p> <p>14 2006 but with up-to-date data.</p> <p>15 Q What data specifically do you think an</p> <p>16 IARC Working Group would need to consider that was</p> <p>17 not available in 2006? What are the key pieces of</p> <p>18 data that you think should be considered by a</p> <p>19 working group?</p> <p>20 A So from an epidemiological database</p> <p>21 point of view, there have been a number of</p> <p>22 publications, as you know, since 2006, including</p> <p>23 some cohort studies, various case-control studies,</p> <p>24 various meta-analyses, a pooled analysis from the</p> <p>25 Terry group. All of that information bears on the</p>	<p>1 sufficient growth in the information base that</p> <p>2 would justify it. And the question is whether</p> <p>3 there are other priorities -- that they have</p> <p>4 things with even higher priorities for them to</p> <p>5 look at.</p> <p>6 Q We agree the perineal use of talc</p> <p>7 currently is classified by IARC as a Group 2B</p> <p>8 chemical, correct?</p> <p>9 A Correct.</p> <p>10 Q So the classification or the definition</p> <p>11 of a Group 2A chemical still applies when there is</p> <p>12 limited evidence of carcinogenicity in humans and</p> <p>13 then sufficient evidence of carcinogenicity in</p> <p>14 experimental animals, correct?</p> <p>15 A Yes.</p> <p>16 Q Has there been developments in the</p> <p>17 experimental animal data since the IARC Working</p> <p>18 Group evaluated the risks associated with the</p> <p>19 perineal use of talc in 2006?</p> <p>20 A I'm not aware whether there has been.</p> <p>21 I -- it does not spring to mind. I can't think of</p> <p>22 any examples.</p> <p>23 Q Now, I noticed in your report you have a</p> <p>24 description, it's on page 24, of the different</p> <p>25 categories that IARC might rate a chemical.</p>
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<p>1 evaluation of cancer risk. It -- it may or may</p> <p>2 not change the view of a working group vis-à-vis</p> <p>3 the view held by the 2006 working group, but</p> <p>4 there's enough new information there that it could</p> <p>5 potentially change points of view.</p> <p>6 And in the mechanism area, I understand</p> <p>7 that there has been additional work on various</p> <p>8 possible areas of -- concerning the migration of</p> <p>9 particles around the body and how this might</p> <p>10 influence the -- the biological plausibility of</p> <p>11 such a -- a process. The possible role, roles of</p> <p>12 inflammation or oxidative stress. There have been</p> <p>13 developments -- there are new publications in</p> <p>14 those areas that might influence a new working</p> <p>15 group or a working group looking at it with new</p> <p>16 eyes.</p> <p>17 For all of those reasons, I think it</p> <p>18 would be timely, and in any case, if a decision</p> <p>19 were made today to do this, such a meeting would</p> <p>20 probably not be held before 2022 or 2023 at the</p> <p>21 earliest. They have a horizon of priorities that</p> <p>22 they're working on. So -- and by then, there</p> <p>23 would likely be additional work that would be</p> <p>24 available.</p> <p>25 So it's an area where I think there is</p>	<p>1 Do you see where I am?</p> <p>2 A Yes, I see where you are.</p> <p>3 Q Okay. And there's a rating system that</p> <p>4 IARC uses that ranges from 1 to 4, correct?</p> <p>5 A Yes.</p> <p>6 Q That -- you have indicated here on</p> <p>7 page 24 on your report that number 4 is not a</p> <p>8 carcinogen. Is that accurate? Is that an</p> <p>9 accurate description of category 4?</p> <p>10 A The wording is longer than that, but</p> <p>11 this is my potted version of what that longer</p> <p>12 version means.</p> <p>13 Q The actual definition is that it is</p> <p>14 probably not carcinogenic, correct?</p> <p>15 A Correct.</p> <p>16 MS. BRANSCOME: Would now be a good time</p> <p>17 for a break?</p> <p>18 MS. PARFITT: I think so. We can take a</p> <p>19 break. Thank you.</p> <p>20 THE VIDEOGRAPHER: We are going off the</p> <p>21 record at 2:51 p.m.</p> <p>22 (Recess.)</p> <p>23 THE VIDEOGRAPHER: This is the beginning</p> <p>24 disc number 4 in the deposition of Jack</p> <p>25 Siemiatycki. We're going back on the record at</p>

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<p style="text-align: right;">Page 146</p> <p>1 3:27 p.m. 2 BY MS. BRANSCOME: 3 Q Good afternoon, again, Dr. Siemiatycki. 4 A Hi. 5 Q Do you still agree with the IARC 6 characterization that the case-control studies 7 evaluating a potential connection between perineal 8 talc powder exposure and ovarian cancer are 9 unusually consistent? 10 A Unusually -- they're very consistent. 11 I'm not sure I would choose the word "unusually." 12 Sometimes when 20 people write a document, 13 everyone doesn't agree with every word, but they 14 are very consistent. 15 Q Do you agree with the IARC determination 16 that the excess in risk in those case-control 17 studies is, quote, modest? 18 A That the what, the increase in risk? 19 Q Or the excess of risk. 20 A Yeah, the -- I mean, the terminology 21 around strength of association -- weak, modest, 22 strong, very strong, medium, et cetera -- it 23 doesn't have -- there are no regulations. There's 24 no epidemiologic handbook that says if a relative 25 risk is in this range, you call it weak or</p>	<p style="text-align: right;">Page 148</p> <p>1 this -- there are not many that have such high 2 relative risks. 3 I'm just giving you a bit of background 4 because the terminology is controversial, and I 5 know it plays into the case of how we -- how we 6 characterize the associations around talc and 7 ovarian cancer. 8 There are a lot of associations that are 9 much less than -- with relative risks much lower 10 than ten that are very well accepted as being 11 causal associations. And so the idea that 12 associations have to be, quote/un- -- quote, 13 strong in the sense that the smoking-lung cancer 14 association was strong is not really tenable any 15 more. There are so many -- most known carcinogens 16 don't have such strong -- don't have such high 17 relative risks. So where you draw the line 18 between strong, moderate, weak, and so on, is a 19 kind of -- is a vague notion. 20 If you're asking me how I would 21 characterize it or how it's characterized -- I'm 22 not sure whether you want to go -- to ask how I 23 would characterize it or how it's characterized by 24 other people or -- 25 Q So, respectfully, Dr. Siemiatycki, my</p>
<p style="text-align: right;">Page 147</p> <p>1 moderate and so on and so forth. 2 So the term "moderate" -- actually, the 3 terminology around strength of associations was 4 probably most influenced by the smoking and lung 5 cancer situation in the '50s and '60s where there 6 were relative risks of ten approximately, ten 7 times as high of risk for smokers as for 8 nonsmokers of getting lung cancer, and that was 9 considered a benchmark for strong associations. 10 And it was not known then whether most carcinogens 11 would fall -- most carcinogens that would be 12 discovered later than that era would fall into the 13 category, you know, of relative risks, around ten 14 or around five or around two or whatever. 15 So the -- the use of the terms "strong," 16 "medium," "weak" has kind of been -- what's the 17 word? -- benchmarked, I guess, by the smoking-lung 18 cancer association. And things that -- 19 subsequently relative risks that were less than in 20 that order of magnitude of ten or so where people 21 didn't refer to them as strong because they were 22 not as strong as smoking and lung cancer. 23 It has subsequently turned out that the 24 level of relative risk for smoking and lung cancer 25 is exceptional among known carcinogens, and that</p>	<p style="text-align: right;">Page 149</p> <p>1 question was, do you agree with the IARC 2 classification of the increase in risk as, quote, 3 modest? 4 A So there was no such classification. It 5 was a word used in a sentence, I guess. There 6 is -- they never classified the association as 7 being strong, weak, moderate or whatever. It was 8 part of a narrative about the -- the body of 9 evidence. 10 Do I agree that -- yeah, I would use 11 that term today. 12 I'm sorry if I digressed from your 13 question. 14 Q You would agree that the point estimate 15 of the meta-analysis that you conducted in 2018 16 that's contained in your report marked Exhibit 10 17 is actually lower than the point estimate that was 18 reported in the Langseth 2008 study, correct? 19 A That's correct. 20 Q And the Langseth 2008 paper, the 21 meta-analysis that you and your coauthors 22 conducted resulted in a 1.35 relative risk, 23 correct? 24 A That's correct. 25 Q And in Exhibit 10, your report in the</p>

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<p style="text-align: right;">Page 150</p> <p>1 MDL, the relative risk point for your 2018 2 meta-analysis is 1.28, correct? 3 A In the 2018 -- yes, that's correct. 4 Q Is it your opinion -- well, let me just 5 ask you, what classification should perineal use 6 of talc get with respect to ovarian cancer under 7 the IARC scale? 8 MS. PARFITT: Objection. Form. 9 THE WITNESS: I -- I'm very reluctant to 10 answer that question because it takes a lot of 11 input from different disciplines to produce an 12 IARC evaluation and then IARC classification. And 13 I feel it's presumptuous for any one person from 14 one discipline to take on that function. 15 What I can say is that in this 16 situation, the epidemiologic evidence alone is 17 sufficient to make the -- make me think that it's 18 more likely than not that there is a causal 19 association. How that proposition would feed into 20 an IARC evaluation is something that would -- that 21 a multidisciplinary group would need to work out, 22 but I think there's at least enough evidence to 23 say it's more likely than not. 24 BY MS. BRANSCOME: 25 Q Because you would agree that a work --</p>	<p style="text-align: right;">Page 152</p> <p>1 causality, but it's not a one-to-one kind of 2 relationship. 3 Now I've lost the thread. I'm sorry. 4 BY MS. BRANSCOME: 5 Q That's okay. I'm going to ask you the 6 question again. 7 Simply the fact that the epidemiological 8 evidence -- 9 A Yeah. 10 Q -- may support a conclusion that more 11 likely than not perineal talc use can cause 12 ovarian cancer, that fact alone is not sufficient 13 to result in a Group 2A classification of a 14 chemical under IARC. 15 MS. PARFITT: Objection. Form. 16 BY MS. BRANSCOME: 17 Q Is that fair? 18 A It's fair -- in principle, it's a fair 19 statement. My feeling is that if that occurred in 20 a meeting, and if -- you know, in an IARC Working 21 Group, the group is subdivided into four 22 subgroups: Initially, an epidemiology group, 23 animal experimentation group, other biological 24 mechanisms, and then expose -- an exposure group. 25 If the epidemiology group came back, had</p>
<p style="text-align: right;">Page 151</p> <p>1 an IARC Working Group, for example, if a former -- 2 formal evaluation was done on talc, in order to 3 classify talc as say a Group 2A, that working 4 group would need to consider multiple lines of 5 evidence, correct? 6 MS. PARFITT: Objection. Form. 7 THE WITNESS: That's correct. 8 BY MS. BRANSCOME: 9 Q And simply the determination, if it were 10 the case that the epidemiological evidence might 11 support the conclusion that perineal use of talc 12 more likely than not can cause ovarian cancer, 13 would not by itself be sufficient for a Group 2A 14 rating. Is that fair? 15 MS. PARFITT: Objection. Form. 16 THE WITNESS: The IARC classification 17 was developed in the 1970s. It was not developed 18 in order to fit into a template that can be used 19 in the courtroom. So terms like "more likely than 20 not" or, you know, whatever terminology would be 21 used in a courtroom around this sort of thing does 22 not fit perfectly on the IARC classification 23 scale. 24 I understand why courts use IARC 25 evaluations as an input to understanding</p>	<p style="text-align: right;">Page 153</p> <p>1 a feeling that there likely -- it was more likely 2 than not that there is a causal association, they 3 have the prerogative to categorize the evidence as 4 being sufficient or limited. And it's not clear 5 how they would categorize the epidemiologic 6 evidence. That would feed into the final 7 evaluation. 8 Q So you would say, as you sit here today, 9 based on what you know about the epidemiological 10 evidence with respect to the perineal use of talc 11 and ovarian cancer, it's not clear whether that 12 would satisfy the criteria for sufficient evidence 13 of carcinogenicity. Is that fair? 14 MS. PARFITT: Objection. Misstates his 15 testimony. 16 THE WITNESS: For -- for a particular 17 working group. Because the other particularity of 18 the IARC process, as with other -- from high level 19 scientific processes, is that it depends a lot on 20 scientific judgment. There's -- there are 21 guidelines for how to combine animal evidence and 22 basic biology evidence in epidemiology, but all of 23 these guidelines are just models of how the final 24 evaluation might be determined. 25 Each working group is sovereign and can</p>

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<p>1 take the entire body of evidence and make a</p> <p>2 decision outside the -- the template -- the -- the</p> <p>3 typical template. So a working group could look</p> <p>4 at the evidence and decide is it Group 1, it's</p> <p>5 Group 2B, Group 2A, based on the totality of</p> <p>6 evidence.</p> <p>7 In general, if the epidemiology is</p> <p>8 convincing, it would be Group 1 or Group 2A if</p> <p>9 it's convincing but not -- or let's say if it's --</p> <p>10 if it indicates a risk but it's not definitive.</p> <p>11 BY MS. BRANSCOME:</p> <p>12 Q So you would say if the epidemiology</p> <p>13 indicates a risk but is not definitive, you think</p> <p>14 there's a possibility a chemical would be</p> <p>15 classified as Group 1?</p> <p>16 MS. PARFITT: Objection. Form.</p> <p>17 THE WITNESS: It depends how close to</p> <p>18 definitive it is. So if the feeling of the group</p> <p>19 is that it's almost certain on the basis of</p> <p>20 epidemiologic evidence, then they could classify</p> <p>21 it as Group 1, and they would classify the</p> <p>22 epidemiologic evidence as sufficient in that case.</p> <p>23 BY MS. BRANSCOME:</p> <p>24 Q Okay. On the scale of definitiveness,</p> <p>25 where would you place the evidence of the perineal</p>	<p>1 (A discussion was held off the record.)</p> <p>2 BY MS. BRANSCOME:</p> <p>3 Q Do you remember what you were answering</p> <p>4 or should we --</p> <p>5 A I prefer if -- I'm sorry. If you could</p> <p>6 ask again and --</p> <p>7 Q Let me ask it a different way. Is it</p> <p>8 possible for a confounding variable to essentially</p> <p>9 infect all of the epidemiology on a particular --</p> <p>10 looking at a particular causal relationship?</p> <p>11 MS. PARFITT: Objection. Form.</p> <p>12 THE WITNESS: It is possible.</p> <p>13 BY MS. BRANSCOME:</p> <p>14 Q Okay. If that were to happen and you</p> <p>15 see evidence in the epidemiology that shows a</p> <p>16 consistent increase in risk but there's the</p> <p>17 potential for a confounding variable, would it be</p> <p>18 important to look at the potential biological</p> <p>19 mechanism to see whether or not the agent might be</p> <p>20 causing the outcome?</p> <p>21 A So the confounding factor is -- is a</p> <p>22 factor that could be captured in epidemiologic</p> <p>23 studies but hasn't been. Is that what you are</p> <p>24 alluding to? And the biologic -- but the biologic</p> <p>25 mechanism that you're referring to would involve</p>
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<p>1 use of talc and ovarian cancer as of today?</p> <p>2 A Based on the epidemiologic evidence.</p> <p>3 Q Correct.</p> <p>4 A I -- I go back to more likely than not.</p> <p>5 Not -- not definite, but more likely than not.</p> <p>6 Q Is it possible to have a situation where</p> <p>7 the epidemiological evidence is supportive of a</p> <p>8 causal association, but the group working on</p> <p>9 biological mechanism determines that there isn't a</p> <p>10 sufficient mechanism by which that chemical could</p> <p>11 have caused that outcome?</p> <p>12 A That can happen.</p> <p>13 Q And what would the explanation for an</p> <p>14 inconsistency like that be?</p> <p>15 A It would require quite a high level of</p> <p>16 understanding of the mechanistic evidence.</p> <p>17 So -- I -- I don't know if it has</p> <p>18 happened, so I'm -- I'm trying to think through</p> <p>19 memory whether I can think of any examples. I'm</p> <p>20 not sure that it has happened.</p> <p>21 THE VIDEOGRAPHER: Excuse me, Counsel.</p> <p>22 The microphone just fell.</p> <p>23 THE WITNESS: Oh, I'm sorry.</p> <p>24 MS. BRANSCOME: That's okay. You just</p> <p>25 knocked off your microphone.</p>	<p>1 that confounding factor or is this -- are you --</p> <p>2 are you confounding "confounding" with -- with</p> <p>3 biologic mechanism issues?</p> <p>4 Q Okay. Let me -- let me give you a</p> <p>5 specific hypothetical.</p> <p>6 A Yes.</p> <p>7 Q Okay. So let's say hypothetically, for</p> <p>8 example, recall bias --</p> <p>9 A Okay.</p> <p>10 Q -- affects the epidemiology related to</p> <p>11 looking at the causal relationship, and whether</p> <p>12 you agree with it or not, but we'll just say</p> <p>13 hypothetically that affected the epidemiology of</p> <p>14 talc use and ovarian cancer.</p> <p>15 A Can I just interrupt for a</p> <p>16 terminological thing? So typically we don't refer</p> <p>17 to recall bias as a confounding factor.</p> <p>18 Q Ah.</p> <p>19 A We refer to it as a bias, a type of</p> <p>20 bias, but -- you know, that's just technical, but</p> <p>21 for the record, if we're going to be discussing</p> <p>22 this further.</p> <p>23 Q I appreciate the clarification.</p> <p>24 A Thank you.</p> <p>25 Q Well, first of all, let me just ask you,</p>

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<p style="text-align: right;">Page 158</p> <p>1 is recall bias something that could affect the 2 reliability of conclusions drawn from 3 epidemiological studies that rely on recall to 4 define exposure to the agent? 5 A Yes, it could, hypothetically. 6 Q Okay. Is recall bias something that 7 potentially could affect the epidemiological 8 studies of the perineal use of talc? 9 A Yes, theoretically, it could. 10 Q Okay. In situations where there is a 11 potential bias or a confounding variable that has 12 not been identified, how should epidemiological 13 evidence be evaluated in comparison to the other 14 categories of evidence that are considered, for 15 example, by an IARC Working Group? 16 A Well, these things would typically be 17 evaluated in a -- a nonquantitative way. You 18 can't really quantify what is the potential impact 19 of a confounder that you don't know about or that 20 you haven't measured. It's kind of a theoretical 21 thing. 22 And the same with -- with recall bias 23 where there could be some evidence about it. And 24 certainly when I reviewed the evidence on this 25 topic, the possibility of recall bias was one of</p>	<p style="text-align: right;">Page 160</p> <p>1 exposures, all -- you know, environmental things 2 that they've been exposed to, et cetera, there -- 3 there's no reason why exposure to talc would be 4 the one item in epidemiologic questionnaires that 5 would provoke recall bias where nothing else does. 6 So if it's a part of a general 7 phenomenon, this recall bias, which is certainly a 8 hypothetical possibility, we would see that most 9 of the associations that were tested in case- 10 control studies would be found to be high risks, 11 maybe significantly high risks. 12 That's not what we observed. That's not 13 what I've observed in my research. I have 14 estimated -- and in the book that I showed this 15 morning, there are literally thousands of odds 16 ratio estimates in there. But in all of my 17 research on over nearly four decades, I've 18 published a lot of evidence, and I can show some 19 examples, where there's no difference between 20 cases and controls because there is no effect, 21 there's no causal association between the two 22 things, and the case -- although people were -- 23 cases were asked about, let's say, alcohol 24 consumption, and controls were asked about alcohol 25 consumptions, the cases didn't overreport. They</p>
<p style="text-align: right;">Page 159</p> <p>1 the main stumbling blocks to arriving at an 2 opinion, as it was for the IARC panel in 2006. 3 You know, we are all aware of that hypothetical 4 possibility, and we think about whether something 5 of that magnitude -- something like that could 6 artifactually generate an appearance of a relative 7 risk. 8 My own way of dealing with that was to 9 look at the phenomenon of recall bias from the 10 perspective of both my own research, which has 11 mainly involved case-control studies, some cohort 12 studies but mainly case-control studies, and 13 research that I've read about, experienced, 14 reviewed for journals, et cetera. 15 And if the phenomenon of recall bias 16 were sort of a general across-the-board phenomenon 17 that infects and in a way discredits all 18 case-control studies -- interviewing cases, people 19 who are sick people, interviewing people who are 20 well and comparing the responses -- if this were 21 an inherent systemic problem, what we would 22 observe in general would be a plethora of fake 23 excess risks. Because almost everything you would 24 ask people about, whether it's smoking, alcohol 25 consumption, physical activity, diet, workplace</p>	<p style="text-align: right;">Page 161</p> <p>1 didn't say, Oh, well, they want to know if this 2 caused my cancer, and therefore I'm going to tell 3 them, yes, I consumed a lot of beer and wine and 4 so on, or smoking or whatever. 5 So we don't see this as a general 6 phenomenon that people overreport -- that cases 7 overreport compared to controls. 8 Q Have you looked at the phenomenon of 9 recall bias specifically when the agent being 10 investigated is part of public wide -- wide scale 11 litigation? 12 MS. PARFITT: Object to form. 13 THE WITNESS: So I haven't personally -- 14 let me just think if any of my research has 15 involved situations analogous to that. 16 Yes. Cell phones and brain cancer. So 17 I was involved in a large cell phone and brain 18 cancer study, and we asked cases about their use 19 of cell phones, and we asked controls about their 20 use of cell phones. And while the interpretation 21 of the results of the study were somewhat 22 controversial, there was no generalized phenomenon 23 of cases reporting more cell phone use than 24 controls in that particular study. 25 So that -- I can't think of another</p>

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<p style="text-align: right;">Page 162</p> <p>1 example in my career of sort of one of these 2 generally suspected things. I mean, I've studied 3 a lot of occupational exposures, but those tend to 4 be more obscure, and people don't, you know, have 5 the same visceral reaction maybe to were you 6 exposed to formaldehyde or benzene or this or 7 that. 8 BY MS. BRANSCOME: 9 Q For purposes of your meta-analysis, you 10 looked at the binary question of ever having used 11 talc and never having used talc, correct? 12 A Among other -- not only that, but that 13 in addition to, yeah. 14 Q Yes. For example, you were not -- your 15 data isn't stratified based off of having used it 16 to a certain degree of frequency, correct? 17 A The -- the meta-analysis, no. 18 Q Okay. 19 A I -- I looked at dose-response 20 information within the studies that provided it, 21 but I didn't do any meta-analyses of the -- of the 22 dose-response data. 23 Q Okay. So I -- I asked you sort of the 24 broad question about what has changed in the 25 scientific literature with respect to perineal use</p>	<p style="text-align: right;">Page 164</p> <p>1 A Yeah. 2 Q Are those areas in which you contend 3 there is developments in the scientific literature 4 that is relevant to the question of the connection 5 between perineal use of talc and ovarian cancer? 6 A Yes. 7 Q Okay. So I just wanted to talk to you 8 about which of those categories you are 9 independently offering an expert opinion as 10 opposed to you are deferring to others. Does that 11 make sense? 12 A Yes. 13 Q All right. So you are offering an 14 expert opinion about developments in the 15 epidemiology, correct? 16 A Correct. 17 Q Are you testifying as an expert in 18 developments in the scientific literature with 19 respect to toxicology? 20 A No. 21 Q Are you testifying as an expert with 22 respect to developments in the scientific 23 literature in molecular biology? 24 A No. I -- I'm aware that there have been 25 some publications since 2006 in that domain, but</p>
<p style="text-align: right;">Page 163</p> <p>1 of talc since the 2006 IARC Working Group, but I 2 want to point you now sort of specific to what you 3 say in your report and ask you some more detailed 4 questions about what's changed. 5 So if you could turn to page 67 of 6 Exhibit 10 there. 7 A Yes. 8 Q Sorry, just one moment. My pencil has 9 died on me. Just give me one second. All right. 10 All right. So you have a Section 9 here 11 that says: "Contrast with IARC monograph and 12 other reviews." Do you see that? 13 A I do. 14 Q All right. And you asked the question 15 in your report: "What has changed in the years 16 since the IARC review?" Correct? 17 A Correct. 18 Q All right. And you talk about 19 additional studies and scientific literature 20 addressing a variety of topics, including 21 epidemiology, toxicology, molecular biology and 22 mechanistic studies; is that correct? 23 A Sorry, are -- you're saying that I 24 referred to those domains? 25 Q Yes.</p>	<p style="text-align: right;">Page 165</p> <p>1 I'm not offering an opinion about those. 2 Q Are you offering an opinion with respect 3 to the biological mechanism by which the perineal 4 use of talc may or may not cause ovarian cancer? 5 A Not an opinion. Again, I'm -- I'm 6 acknowledging that there is new evidence, and I 7 mention some of that, yes. 8 Q But as an expert, you're not here to 9 opine on the strengths and weaknesses of that 10 evidence or how it might be weighted against other 11 evidence that's in the field related to biological 12 mechanism; is that fair? 13 MS. PARFITT: Objection. Form. 14 THE WITNESS: That's correct. 15 BY MS. BRANSCOME: 16 Q Okay. Now, you state in your report 17 that: "The various possible biases" -- this is 18 still on page 67 -- "that are on the table remain 19 substantially similar to the ones that were 20 considered by the IARC panel." Correct? 21 A Correct, I said that. 22 Q Okay. What are the various possible 23 biases that you refer to there? 24 A Well, I -- I'd have to go back to the 25 IARC 2006 report to give you a full answer, but I</p>

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<p>1 guess the main things that were highlighted at the</p> <p>2 time were measurement error, how to assess</p> <p>3 exposure to talc, and what the impact of</p> <p>4 measurement error might be on the estimates,</p> <p>5 recall bias and the possible impact that that</p> <p>6 might have.</p> <p>7 Q What do you mean by "measurement error"?</p> <p>8 A Measurement error is closely related to</p> <p>9 recall bias, but it's not the same thing.</p> <p>10 Measurement -- recall bias refers to differences</p> <p>11 between cases and controls in the way they</p> <p>12 respond. Measurement error refers to inaccurate</p> <p>13 recall and reporting, irrespective of whether</p> <p>14 there are cases and controls. There can be</p> <p>15 exactly the same degree of error in -- in recall</p> <p>16 between cases and controls.</p> <p>17 So it's not differential. It's not --</p> <p>18 it's not a recall bias between the two groups.</p> <p>19 But if there's error, if some people report high</p> <p>20 use, and in fact they had medium use and all --</p> <p>21 all this sort of thing, that impacts the estimates</p> <p>22 of relative risk -- even though those errors are</p> <p>23 the same in the cases and controls, that impacts</p> <p>24 the estimates of relative risk, and that generally</p> <p>25 impacts it in the direction of attenuating the</p>	<p>1 there is error in diagnose -- I guess you -- what</p> <p>2 you're alluding to -- let me make sure, you're</p> <p>3 alluding to possible misdiagnosis between</p> <p>4 mesothelioma and ovarian cancer. Is that where</p> <p>5 you're going?</p> <p>6 Q That -- that is one possibility, yes.</p> <p>7 A So in the case of a -- in this situation</p> <p>8 of a cohort study, following up a group of women,</p> <p>9 some of them really get mesotheliomas that are not</p> <p>10 linked to talc exposure, but those women are</p> <p>11 classified as ovarian cancers erroneously.</p> <p>12 They -- that error would have the effect of</p> <p>13 reducing the apparent risk compared to the real</p> <p>14 risk of talc and ovarian cancer. In that context,</p> <p>15 it would have that effect.</p> <p>16 In the context of a case-control study,</p> <p>17 where you start with a group of women who have</p> <p>18 been diagnosed with ovarian cancer but in truth</p> <p>19 some of them had peritoneal mesotheliomas, and you</p> <p>20 compare them to controls, the women who -- and</p> <p>21 assuming that talc has no effect on peritoneal</p> <p>22 mesothelioma, which is another assumption to make,</p> <p>23 but -- but assuming that it does on ovarian</p> <p>24 cancer, just for the sake of argument, lumping in</p> <p>25 the mesotheliomas with the ovarian cancer cases</p>
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<p>1 relative risk estimates, lowering them from what</p> <p>2 they really are.</p> <p>3 So that's one error -- one type of error</p> <p>4 that is -- that permeates epidemiology and that is</p> <p>5 present, and that we have to be conscious of and</p> <p>6 try to evaluate.</p> <p>7 Q Could there be measurement error related</p> <p>8 to misdiagnoses?</p> <p>9 A Yes.</p> <p>10 Q And if there was misdiagnoses in the</p> <p>11 sense that someone was diagnosed with ovarian</p> <p>12 cancer but in fact had a different form of cancer,</p> <p>13 that could actually result in an artificially</p> <p>14 inflated relative risk, correct?</p> <p>15 MS. PARFITT: Objection. Form.</p> <p>16 THE WITNESS: So that kind of error in</p> <p>17 diagnosis has subtly different meaning in the</p> <p>18 context of a case-control study and a cohort</p> <p>19 study. And if -- if you want, I'll -- I could try</p> <p>20 to answer your question in -- in each context.</p> <p>21 BY MS. BRANSCOME:</p> <p>22 Q Okay.</p> <p>23 A So it has an effect in both contexts,</p> <p>24 but it's a slightly different effect.</p> <p>25 So in the context of a cohort study, if</p>	<p>1 would again create a reduction in the estimate of</p> <p>2 relative risk.</p> <p>3 So in both situations -- I would have to</p> <p>4 work it out on a pad of paper, but I think in both</p> <p>5 cases -- and I did write something about this in</p> <p>6 my report, so if you don't --</p> <p>7 Q Feel free to take a look. Sure.</p> <p>8 A -- mind. Thinking out loud in the</p> <p>9 middle of a deposition is sometimes harder than</p> <p>10 thinking out loud at home. (Peruses document.)</p> <p>11 So I'm looking at page 57,</p> <p>12 Section 7.2.5, at the bottom of the page and then</p> <p>13 going on to the next page, and see if what I said</p> <p>14 then is -- corresponds roughly to what I just</p> <p>15 said.</p> <p>16 I think basically it -- it agrees with</p> <p>17 what I just said. Basically the effect would be</p> <p>18 to attenuate estimates in this situation.</p> <p>19 Q So we discussed -- of the various</p> <p>20 possible biases that might affect the</p> <p>21 epidemiology, we talked about measurement error,</p> <p>22 recall bias, diagnostic error.</p> <p>23 Are there any other potential biases</p> <p>24 that should be considered when evaluating the</p> <p>25 epidemiology on the use of talc peritoneally?</p>

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<p style="text-align: right;">Page 170</p> <p>1 A Yes. So I -- I did list a bunch of 2 possible biases in my report. And one of them -- 3 if you don't mind, I'll just go through the titles 4 of the different things that -- starting on 5 page 53. 6 Bias due to nonresponse or 7 nonparticipation. If you carry out a case-control 8 study, and you get -- you identify a group of a 9 hundred women who are cases, and you ask them to 10 participate and only 50 agree to participate, and 11 the ones who agree to participate happen to be the 12 only ones who used talcum powder, and the other 50 13 that you don't know about never used it, that 14 would be a problem. And -- but it also depends 15 what happens among the controls. Among the 16 controls, do you get the same nonresponse bias? 17 So there's a -- that is one possible bias in 18 case-control studies. 19 The second one I listed was recall or 20 reporting bias that we've discussed. 21 The third one is what I call 22 nondifferential or random error, which we 23 discussed. It's error in reporting that is equal 24 in cases and controls, but it has an impact on 25 relative risk estimates.</p>	<p style="text-align: right;">Page 172</p> <p>1 other biases. And this is why I corrected you at 2 the beginning when we were talking about 3 confounding and bias. I mean it's not -- I'm not 4 criticizing you in any way for this. It's -- 5 there is terminological gray zones in 6 epidemiology, so it's not always clear. But -- 7 Q Would it be fair to describe a 8 confounding variable in the context of ovarian 9 cancer as something that as of now is unknown that 10 makes a particular individual more likely to 11 develop ovarian cancer that also, for whatever 12 reason, makes them more likely to use talcum 13 powder? 14 A Yes. That would be a correct 15 interpretation of "confounding." 16 Q And that is something that should be 17 taken into account in evaluating the epidemi- -- 18 epidemiological literature, correct? 19 A That's correct. 20 Q And you would agree that the scientific 21 community at large has not yet understood all of 22 the potential factors that might contribute to a 23 susceptibility to develop ovarian cancer, correct? 24 MS. PARFITT: Objection. Form. 25 THE WITNESS: Sorry, I -- I was hearing</p>
<p style="text-align: right;">Page 171</p> <p>1 The fourth one, which we haven't 2 discussed, has to do -- it's mainly a problem for 3 cohort studies. And if you carry out a cohort 4 study of -- focused on cancer, and you collect 5 information about exposure, and then follow them 6 for two years to find out how many of them got 7 cancer, and whether there is a difference between 8 the people who were exposed and the people who are 9 not exposed, well, that would be pretty hopeless 10 because it takes more than two years for cancers 11 to develop and be diagnosed. So short follow-up 12 periods in cohort studies would be a source of 13 bias in cohort studies. 14 Diagnostic errors, we've just discussed. 15 Initiation of powdering as a result of 16 ovarian cancer, is it possible that some women 17 who -- that there is a statistical association 18 between powdering and ovarian cancer, but it's 19 because the women who get ovarian cancer in the 20 early stages, to relieve symptoms or to deal with 21 discomfort start to use powdering. And so that is 22 a potential bias. 23 Confounding is the next category, and 24 that's -- it's a huge category of potential 25 distortion that is a little bit different from the</p>	<p style="text-align: right;">Page 173</p> <p>1 two things with my two ears. 2 MS. PARFITT: Sorry. 3 THE WITNESS: Can you repeat the last 4 part? 5 BY MS. BRANSCOME: 6 Q Yeah. You would agree that all of the 7 factors that might make someone susceptible to 8 developing ovarian cancer are not currently known. 9 A That's correct. 10 So are -- are you -- are you getting at 11 the potential impact of confounding as -- from 12 unknown factors as something that hasn't been 13 properly evaluated or that is part of this 14 picture? 15 Q I am simply asking you -- 16 A Yes. 17 Q -- questions about your opinions. 18 A Yes, yeah. 19 Q But you agree that the possibility of an 20 unknown confounding variable is something that, as 21 an epidemiologist, you would at least consider 22 when looking at the strength of association 23 established by epidemiological studies, correct? 24 A I would consider it, and I've considered 25 it in the context of this literature, and in my</p>

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<p>1 opinion, it's unlikely that any confounding factor</p> <p>2 or factors would create the pattern of results</p> <p>3 that we see.</p> <p>4 And if I could give you one piece of</p> <p>5 evidence about why I -- you know, that illustrates</p> <p>6 why I think that. A confounding factor can only</p> <p>7 bias the result by a certain amount; not as strong</p> <p>8 as its own relationship to the risk factor.</p> <p>9 So if there's a risk fact- -- if the</p> <p>10 relative risk that we see around 1.3 -- ballpark,</p> <p>11 let's for the sake of argument say 1.3 -- is due</p> <p>12 to a confounding factor, that confounding factor</p> <p>13 would have to have an association with ovarian</p> <p>14 cancer much strong -- stronger than 1.3, but much</p> <p>15 stronger than 1.3.</p> <p>16 And I can -- just to illustrate that, I</p> <p>17 actually have a publication -- I think I gave you</p> <p>18 a copy of that publication of mine that</p> <p>19 illustrates my own research on occupational causes</p> <p>20 of cancer --</p> <p>21 THE VIDEOGRAPHER: Sorry.</p> <p>22 THE WITNESS: Am I again disconnected?</p> <p>23 Okay. When I get excited...</p> <p>24 Yes, that's the one. If I could --</p> <p>25 MS. PARFITT: Make a copy.</p>	<p>1 illustrate the potential impact of confounding in</p> <p>2 this issue of ovarian cancer and talc, and what --</p> <p>3 to explain why I believe that the excess risks</p> <p>4 that we observe are unlikely to be explained by</p> <p>5 confounding.</p> <p>6 Q Okay. You would agree, though, that if</p> <p>7 there was a confounding variable that had a</p> <p>8 relationship with, in this case, ovarian cancer</p> <p>9 that was stronger than 1.3, it could explain an</p> <p>10 increase of 1.3 associated with the use of talc if</p> <p>11 it was similarly connected to the use of talcum</p> <p>12 powder products --</p> <p>13 MS. PARFITT: Objection. Form.</p> <p>14 BY MS. BRANSCOME:</p> <p>15 Q -- correct?</p> <p>16 MS. PARFITT: Objection. Form.</p> <p>17 THE WITNESS: Well, one of the points</p> <p>18 that I want to illustrate is that not only would</p> <p>19 it have to be stronger than 1.3, it would have to</p> <p>20 be a lot stronger than 1.3.</p> <p>21 BY MS. BRANSCOME:</p> <p>22 Q How strong would it need to be?</p> <p>23 MS. PARFITT: Objection. Form.</p> <p>24 THE WITNESS: I'll answer that by -- by</p> <p>25 showing you what -- what we found when we were</p>
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<p>1 THE WITNESS: Do you have any copies?</p> <p>2 MS. PARFITT: I'm looking to see.</p> <p>3 THE WITNESS: So -- well, if I could</p> <p>4 just read a couple of sentences from the abstract</p> <p>5 of this, I'll tell you what this is about. It's</p> <p>6 a study of --</p> <p>7 BY MS. BRANSCOME:</p> <p>8 Q Could you, please, Dr. Siemiatycki,</p> <p>9 identify for me --</p> <p>10 A Oh.</p> <p>11 Q -- what is the paper from which you are</p> <p>12 reading.</p> <p>13 A Yes. This is a paper called "Degree of</p> <p>14 confounding bias related to smoking, ethnic group,</p> <p>15 and socioeconomic status in estimates of the</p> <p>16 associations between occupation and cancer."</p> <p>17 Q Is this something that you cite to or</p> <p>18 reference anywhere in the report that you</p> <p>19 submitted in the MDL?</p> <p>20 A It's only in my CV, which is I think</p> <p>21 part of the record.</p> <p>22 Q What led you to specially identifying</p> <p>23 this article, which you seem to have handy today</p> <p>24 here at the deposition?</p> <p>25 A Because I was thinking about how to</p>	<p>1 examining the associations between different</p> <p>2 occupations and lung cancer.</p> <p>3 So occupation and lung cancer, there are</p> <p>4 some true associations there, as you probably</p> <p>5 know, but -- and we collected information about</p> <p>6 people's occupations. We also collected</p> <p>7 information about their smoking history, their</p> <p>8 socioeconomic status, their ethnicity and so on.</p> <p>9 A lot of factors.</p> <p>10 But the most important part of this was</p> <p>11 looking at the association between lung cancer and</p> <p>12 smoking and -- lung cancer and occupation. We</p> <p>13 chose I think 15 occupations, estimated the odds</p> <p>14 ratios for 15 different associations between</p> <p>15 occupations and lung cancer, and we controlled for</p> <p>16 smoking or we didn't control for smoking. We</p> <p>17 compared the results when you control for smoking</p> <p>18 and when you don't compare -- control for smoking.</p> <p>19 BY MS. BRANSCOME:</p> <p>20 Q Respectfully, Dr. Siemiatycki, I only</p> <p>21 have seven hours to ask you questions.</p> <p>22 A Okay.</p> <p>23 Q Your -- your -- counsel for the</p> <p>24 plaintiffs can ask you to fully explain other</p> <p>25 research that you've done.</p>

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<p>1 A Okay.</p> <p>2 Q It sounds very interesting.</p> <p>3 A Thank you.</p> <p>4 Q But my question to you is, in your</p> <p>5 opinion, how strong would an association have to</p> <p>6 be with a confounding variable in order to play a</p> <p>7 significant role in a 1.3 relative risk?</p> <p>8 A My --</p> <p>9 MS. PARFITT: Objection. Form.</p> <p>10 THE WITNESS: -- guess, it would have to</p> <p>11 be in the order of 3 to 5. Because it also</p> <p>12 depends on the association between a talc</p> <p>13 powdering behavior and this unknown confounder.</p> <p>14 BY MS. BRANSCOME:</p> <p>15 Q Okay. Are there limitations to</p> <p>16 performing a meta-analysis?</p> <p>17 MR. TISI: Do you want to mark that or</p> <p>18 no?</p> <p>19 MS. BRANSCOME: No.</p> <p>20 THE WITNESS: Are there --</p> <p>21 BY MS. BRANSCOME:</p> <p>22 Q -- limitations to performing a</p> <p>23 meta-analysis?</p> <p>24 A I -- I'm not sure what -- like --</p> <p>25 Q I believe you referenced earlier that</p>	<p>1 In -- one of the differences between --</p> <p>2 as I mentioned earlier, between -- some types of</p> <p>3 meta-analyses are carried out on clinical trials,</p> <p>4 in fact, I would say the bulk of meta-analysis is</p> <p>5 conducted in clinical trials research where the</p> <p>6 research protocols are really very standardized</p> <p>7 from one study to another, and that enhances the</p> <p>8 ability to make inferences from the results of a</p> <p>9 meta-analysis.</p> <p>10 In observational epidemiology, this</p> <p>11 isn't true. We have very different kinds of study</p> <p>12 design and problems that arise in different</p> <p>13 studies, and this leads in itself to variability</p> <p>14 and heterogeneity. And it is sometimes imagined</p> <p>15 that heterogeneity is a reflection -- some sort of</p> <p>16 a reflection of different risks in different</p> <p>17 populations or something like that. It's mainly</p> <p>18 -- it's at least in part a reflection of the fact</p> <p>19 that different study designs and different -- just</p> <p>20 not just the overall architecture of the design,</p> <p>21 but the implementation, how people were</p> <p>22 interviewed, what the questions were and so on,</p> <p>23 influences the results of a study. That varies</p> <p>24 from study to study, and that creates</p> <p>25 heterogeneity. So --</p>
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<p>1 you teach a class on epidemiological</p> <p>2 methodologies; is that correct?</p> <p>3 A Yes.</p> <p>4 Q Okay. So presumably, when you teach a</p> <p>5 class you discuss the strengths and the</p> <p>6 limitations of different types of analyses. Fair?</p> <p>7 A It comes into the course, yes.</p> <p>8 Q Okay. So in the context of looking at</p> <p>9 the strengths and the weaknesses of different</p> <p>10 types of analyses, are there any weaknesses or</p> <p>11 limitations to a meta-analysis?</p> <p>12 A Weakness, okay. Because the word</p> <p>13 "limitation" doesn't always mean weaknesses.</p> <p>14 Meta-analysis depends on having reliable</p> <p>15 data. So the basic studies that you use and the</p> <p>16 basic data that you use in a meta-analysis has to</p> <p>17 be sufficiently reliable to support a good</p> <p>18 meta-analysis.</p> <p>19 The data have to be sufficiently</p> <p>20 comparable in nature. So putting apples and</p> <p>21 oranges and grapes into the same meta-analysis</p> <p>22 would be a problem. Different kinds of apples,</p> <p>23 yes, but different -- et cetera. So you have to</p> <p>24 be careful that you're really measuring the same</p> <p>25 thing, have the same outcomes.</p>	<p>1 Q Does heterogeneity -- do you want</p> <p>2 heterogeneity in a meta-analysis? Is it a good</p> <p>3 thing or does it weaken the meta-analysis?</p> <p>4 A It depends on the purpose of the</p> <p>5 meta-analysis. So some meta-analyses have as one</p> <p>6 of their objectives to identify populations in</p> <p>7 which the effect of the drug or the -- whatever</p> <p>8 you're studying is different from one population</p> <p>9 to another. That is a situation where you want to</p> <p>10 identify heterogeneity, and you want to try to</p> <p>11 target heterogeneity and the different</p> <p>12 populations, different studies, the different</p> <p>13 methods of administering medication, or whatever</p> <p>14 the differences are between studies.</p> <p>15 In observational epidemiology, it's</p> <p>16 rarely the case that heterogeneity -- that a</p> <p>17 formal evaluation of heterogeneity is -- is useful</p> <p>18 or actionable. Usually the bottom line result</p> <p>19 doesn't change. For example, there are</p> <p>20 meta-analyses of smoking and lung cancer where the</p> <p>21 meta-analysis demonstrates heterogeneity of the</p> <p>22 results. The results are always between a</p> <p>23 relative risk of 5 or 6 and a relative risk of 10</p> <p>24 or 12.</p> <p>25 Now, for the question of -- for the</p>

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<p style="text-align: right;">Page 182</p> <p>1 qualitative question does smoking cause lung 2 cancer, it really doesn't matter if the relative 3 risk is 5 or 12. So that heterogeneity has 4 absolutely no bearing on the question that is 5 being asked, and the best answer ignore -- would 6 ignore heterogeneity. It doesn't really matter. 7 If you're trying to find out in which 8 populations does smoking have a greater impact, 9 then you might want to say, Okay, let's -- which 10 are the populations where the relative risks were 11 5 and which are populations where the relative 12 risks are 12? Can we identify differences between 13 it? Are they different countries, different 14 ethnic groups, and so on and so forth. 15 So it's a longwinded answer, and I'm not 16 sure if that gets to the question that you were 17 asking. 18 Q Well, you said in your report -- and 19 it's on page 17, if you want to look at it -- you 20 stated -- it's at the top of the page. 21 A Yes. 22 Q "Unless a significant methodological 23 flaw can be identified that has caused the 24 heterogeneity, the best overall estimate remains 25 the meta-estimate."</p>	<p style="text-align: right;">Page 184</p> <p>1 of the weaknesses is that it is sometimes 2 fetishized, and that people put too much -- you 3 know, have sort of a magical belief in the value 4 of meta-analysis result, which is not justified. 5 Often the results of certain critical studies are 6 as valuable or more valuable than those of a 7 meta-analysis, especially when -- especially in 8 observational epidemiology when it's hard to 9 really identify all of the parameters that 10 influence the quality of a study. 11 And so determining what studies to 12 include and which data from each study to include 13 is tricky. It requires judgment. Those judgments 14 can be wrong. They can be contested. Sometimes 15 one very good study is as powerful, but -- it's 16 part of -- a meta-analysis is part of a package of 17 information that I would look at in evaluating the 18 risks. 19 Q Okay. You mentioned the concept that a 20 scientific judgment needs to be used in 21 determining what studies and, more specifically, 22 what data within those studies to include in a 23 meta-analysis, correct? 24 A That's correct. 25 Q And you would agree that -- and I</p>
<p style="text-align: right;">Page 183</p> <p>1 Did I read that correctly? 2 A Yeah. I guess we should read the 3 beginning of the sentence just to -- oh, yes. Oh, 4 yes, I see. Sorry. Yes, I agree with you. 5 Q So what is the basis for that statement? 6 A The basis is that it's correct. Are you 7 offering an alternative to this that I should 8 consider? 9 Q Is there -- I guess my question is, is 10 it -- is it correct because you think it is 11 correct? Or can you point me to something that 12 would support that principle and explain it more 13 fully? 14 A I -- I haven't looked for any 15 documentary evidence that this has been written up 16 in this way anywhere. I've been interpreting 17 meta-analyses in this way, and I believe this to 18 be true. 19 Q Okay. So we talked about a few 20 different things that you articulated as potential 21 weaknesses to a meta-analysis. Are there any 22 other weaknesses to a meta-analysis? 23 A Possibly. Are there any that you can 24 identify? I will be happy to -- you know, I'm 25 just -- to meta-analysis as a concept, I think one</p>	<p style="text-align: right;">Page 185</p> <p>1 believe you just referenced it -- that there can 2 be errors in judgment in determining what studies 3 to include or not include or what data to include 4 or not include, correct? 5 A I -- 6 MS. PARFITT: Objection. Form. 7 THE WITNESS: I would not characterize 8 these things as errors in judgment. There can be 9 differences in judgment that are legitimate 10 that -- where people, equally well motivated and 11 well trained and experienced, can arrive at 12 different judgments on some of these things. 13 BY MS. BRANSCOME: 14 Q Did you have a specific methodology that 15 you used in determining which relative risk or 16 odds ratio to include from each of the studies 17 that you include in your meta-analysis? 18 A Carefully reading the study, carefully 19 reading the tables and the reports of what is in 20 the paper, understanding what is there, and then 21 making a determination on that basis. 22 Q And those were, to use your words, 23 quote, judgment calls; is that fair? 24 A Yes. 25 Q Okay.</p>

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<p style="text-align: right;">Page 186</p> <p>1 A There is no alternative to judgment in 2 science. 3 Q The meta-analysis in your MDL report is 4 different than the meta-analysis in your 2016 5 report; is that correct? 6 A The bottom line result, you're saying? 7 Well, yes, but also in the 2016 report, I 8 presented I think eight different estimates, 9 depending on scenarios of which studies to include 10 and which result from which studies to include, 11 because there were some borderline judgments where 12 I thought the best thing would be just -- just 13 provide all of the different options. 14 In 2018, I adopted a different strategy. 15 I thought, well, the best service I can provide 16 the court is to give my best estimate of which 17 studies and which data to include, and then to 18 provide a set of alternatives that I call 19 sensitivity analyses. So that's one difference 20 between the two reports. 21 Q Okay. 22 A But there were some differences in which 23 studies were included and which result in which 24 studies were included from the one to the other. 25 Q Well, let me start at the very basic</p>	<p style="text-align: right;">Page 188</p> <p>1 is the difference doing it this way or doing it 2 that way. 3 Q Okay. 4 A But it's largely overlapped. I mean, 5 I'll look at it and see if I can quickly recognize 6 which studies might have been -- 7 Q Well, I can point you -- 8 A Okay. If you've done it, that's great. 9 Q Yeah. So you included Green 1997 in 10 your 2016 meta-analysis, correct? 11 A Yes. 12 Q And you did not include Green 1997 in 13 your 2018 meta-analysis, correct? 14 A Correct. 15 Q Why did you -- did including Green 1997 16 in your earlier report, do you consider that to be 17 a flaw? 18 MS. PARFITT: Objection to form. 19 THE WITNESS: I don't consider any of 20 these things flaws. They were judgment calls, and 21 I -- actually, in that case, I learned in between 22 some information that I didn't know in 2016 that 23 made that decision the right one. 24 BY MS. BRANSCOME: 25 Q What information did you learn?</p>
<p style="text-align: right;">Page 187</p> <p>1 level. Are there any studies that are included in 2 your 2018 meta-analysis that were not available at 3 the time that you did your 2016 meta-analysis? 4 A I don't think so. 5 Q Okay. So you mention that you made some 6 changes to which studies you included and even 7 within that, some of your numbers are slightly 8 different. 9 Can you explain to me what changes you 10 made with respect to which studies to include? 11 A So somewhere I did the side-by-side 12 comparison, and I don't think I have -- I don't 13 think I have that with me. So it would take me a 14 bit of time to just compare the two and see how -- 15 how they compare. 16 Q So you generated actually a side-by-side 17 comparison of your 2016 meta-analysis and your 18 2018 meta-analysis? 19 A Well, of -- of the studies that went 20 into them. Well, generated is a kind of a 21 highfalutin word. I listed on a piece of paper, 22 and then I -- beside it I listed the other ones. 23 So I'm pretty sure I did that at some point just 24 to make sure. If I didn't do it on paper, I did 25 it in my mind. I wanted to know, you know, what</p>	<p style="text-align: right;">Page 189</p> <p>1 A Well, a case-control study was carried 2 out in Australia by a team that involved Green and 3 Purdie, and the publication in 1995, I think it 4 was, described their analysis -- sorry, do you 5 want me to stop while you're -- 6 Q Keep going. 7 A The paper in Purdie 1995, I think it is, 8 described the association between talc and ovarian 9 cancer. I had that in my database. 10 And I also had -- a couple of years 11 later, there was a paper by Green that was not 12 focused on talc. It was focused on risks that 13 were related to -- to other -- well, to other 14 gynecological issues in relation to ovarian 15 cancer. But in there she -- in the text, not in 16 any table but in the text, she provided a result 17 on talc and ovarian cancer. 18 Because that paper was published in 19 2000 -- in 1997, the Green, et al., paper, I 20 assumed that that was an extension of the 2000 -- 21 of the data that was used for the 1995 paper, and 22 that it actually included more information and 23 more up-to-date information than the 1995 paper 24 published two years earlier. I had some doubts 25 about that. But that was the decision I made in</p>

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<p style="text-align: right;">Page 190</p> <p>1 2016. In general, when there were different 2 reports from the same study at different 3 intervals, I took the most recent one as being the 4 more definitive one. 5 When I started analyzing for the 2018 6 report, I had lingering -- I remained with the 7 lingering doubts about the Green study -- the 8 Green report and whether it actually was an 9 updated version of the talc results from 2016 -- 10 from my 2016 report. 11 And I wrote to Adele Green, who I know 12 as an acquaintance, not well but enough to write 13 and say, You know, what's going on with these -- 14 what was going on with these two papers? Is it 15 the fact that the result -- which one has the most 16 definitive result on talc and ovarian cancer, the 17 earlier one or the more recent one? And she wrote 18 back and said, The earlier one does. That the 19 later one -- and I can't remember the exact 20 explanation, but it had to do with some cases 21 being dropped because of reasons having nothing to 22 do with talc but having to do with other 23 hypotheses that she was examining. 24 So in any case, the two results are 25 identical. So it makes no difference. But that</p>	<p style="text-align: right;">Page 192</p> <p>1 studies over time, the relative risk for the 2 association between peritoneal use of -- I mean 3 perineal use of talc and the development of 4 ovarian cancer has actually gone down? 5 MS. PARFITT: Objection. Form. 6 THE WITNESS: I -- I haven't evaluated 7 that, and I have no reason to agree or disagree 8 with it. If you want me to spend a bit of time 9 looking to see if I can -- 10 BY MS. BRANSCOME: 11 Q Well, for example -- 12 A -- confirm or -- 13 Q You are familiar with the Berge 2018 14 paper, correct? 15 A Yeah, yeah. 16 Q And the authors in that paper said: "We 17 confirm the trend toward lower overall risk 18 estimates as more evidence accumulated." 19 MS. PARFITT: Can we get that article in 20 front of him? 21 MS. BRANSCOME: Of course. 22 MS. PARFITT: Thank you. 23 MS. BRANSCOME: It is tab 48. 24 (A discussion was held off the record.) 25 MS. PARFITT: It's tab 18?</p>
<p style="text-align: right;">Page 191</p> <p>1 is, in answer to your question, why did it change, 2 it wasn't capricious issues. It wasn't wrong. It 3 was the right thing to do. 4 Q Did you retain copies of the e-mail 5 correspondence that you had with Green? 6 A I imagine that I did, but I -- this 7 would have been eight months ago maybe or 8 something. 9 Q Would it be fair to say that you relied 10 on Green's representation of which dataset was 11 more fulsome in determining what to use in your 12 2018 metadata? 13 A Yes. 14 Q And that was something she communicated 15 to you by e-mail, correct? 16 A That's right. 17 MS. BRANSCOME: We can meet and confer 18 about this offline, but we would request 19 production of those e-mails. 20 MS. PARFITT: We'll take it under 21 advisement. Thank you. 22 MS. BRANSCOME: Okay. 23 BY MS. BRANSCOME: 24 Q Do you agree that in terms of the trend 25 for relative risk, with the addition of newer</p>	<p style="text-align: right;">Page 193</p> <p>1 THE WITNESS: Tab 48? 2 BY MS. BRANSCOME: 3 Q Tab 48. 4 A I don't have a tab 48. 5 Q It may be in your second binder. 6 A Oh. 7 MS. PARFITT: I will take this one out. 8 And I'll take this one for you. 9 THE WITNESS: Thank you. 10 MS. PARFITT: Of course. 11 THE WITNESS: Thank you. 12 BY MS. BRANSCOME: 13 Q Dr. Siemiatycki, are you familiar with 14 the article that is located there behind tab 48? 15 A Yes, I am. 16 Q Berge is the lead author on this 17 publication titled "Genital use of talc and risk 18 of ovarian cancer: A meta-analysis." Correct? 19 A Yes, correct. 20 Q I believe earlier you said that Berge 21 "beat you to the punch" might have been the phrase 22 that you used. 23 What did you mean by that? 24 A If this had never appeared, I might have 25 worked on a manuscript to submit for publication</p>

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<p>1 on my meta-analysis before today, sometime in the</p> <p>2 past.</p> <p>3 Q Do you rely on Berge 2018?</p> <p>4 MS. BRANSCOME: Let's go ahead and mark</p> <p>5 that actually as Exhibit 12.</p> <p>6 (Exhibit No. 12 was marked for</p> <p>7 identification.)</p> <p>8 MR. TISI: How long have we been going?</p> <p>9 How long have we been going?</p> <p>10 MS. BRANSCOME: Just under five hours.</p> <p>11 MR. TISI: No, how long have we been</p> <p>12 going on this one?</p> <p>13 MS. BRANSCOME: We can take a break</p> <p>14 if -- do you need a break?</p> <p>15 MR. TISI: I'm just asking.</p> <p>16 MS. PARFITT: Do you want a break?</p> <p>17 THE WITNESS: No, let's finish -- let's</p> <p>18 finish with this.</p> <p>19 MS. PARFITT: Okay.</p> <p>20 (A discussion was held off the record.)</p> <p>21 BY MS. BRANSCOME:</p> <p>22 Q Do you rely in forming your opinions on</p> <p>23 this case on the Berge article that we just marked</p> <p>24 as Exhibit 12?</p> <p>25 A I formed my opinions before knowing</p>	<p>1 here that I'm -- I haven't fully integrated into</p> <p>2 my evaluation of this paper. But I know what's in</p> <p>3 it. I know what's the other one. I know what's</p> <p>4 in this one.</p> <p>5 Q Okay. So back to my question,</p> <p>6 Dr. Siemiatycki.</p> <p>7 A Yeah.</p> <p>8 Q You stated that you believe that the</p> <p>9 Berge 2018 study supports the conclusions that you</p> <p>10 have reached in this litigation, and my question</p> <p>11 to you was, what do you mean by that?</p> <p>12 A Well, it supports it in a few ways.</p> <p>13 One -- and from my point of view, the most</p> <p>14 important one, but probably not for anyone else --</p> <p>15 is that they carried out a search of the</p> <p>16 literature using a much more intensive and -- a</p> <p>17 much more intensive procedure than I had. I had</p> <p>18 full confidence in the procedure that I had used,</p> <p>19 but it was not as long, as lengthy, as costly, et</p> <p>20 cetera, et cetera, as what -- and the bottom line</p> <p>21 was that they didn't find any papers -- relevant</p> <p>22 papers that I hadn't found. So I was very</p> <p>23 reassured by this.</p> <p>24 The second thing is that the bottom line</p> <p>25 meta-analysis result -- well, no, the second thing</p>
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<p>1 about this article.</p> <p>2 Q Do you believe that the Berge 2018 study</p> <p>3 supports the conclusions that you have reached in</p> <p>4 your own meta-analysis?</p> <p>5 A Yes, I think it does.</p> <p>6 Q In what way?</p> <p>7 A Well, let me preface that also by saying</p> <p>8 that there's been a bit of a -- a history to this</p> <p>9 article of -- I thought the publication -- there</p> <p>10 was a version published in 2017, which I thought</p> <p>11 was the definitive version that I've always kept</p> <p>12 in my binders as the Berge article, and it's only</p> <p>13 very recently that I actually came upon this</p> <p>14 particular version, which is not greatly changed</p> <p>15 from the 2017 but slightly changed, and I haven't</p> <p>16 fully digested the small changes that have been</p> <p>17 made.</p> <p>18 Q If you could -- sorry for the multiple</p> <p>19 binders, but if you want to look at your first</p> <p>20 binder, tab 13, we can see if that's the paper</p> <p>21 that you previously had reviewed as the Berge</p> <p>22 paper.</p> <p>23 A I -- I don't mind answering questions in</p> <p>24 relation to this version. Just -- I just wanted</p> <p>25 to point out that there are a couple of things</p>	<p>1 is that the actual results that they chose from</p> <p>2 the different studies were very similar in most</p> <p>3 cases to the ones I had chosen from the different</p> <p>4 study. So there was a degree of corroboration</p> <p>5 there that I was happy about.</p> <p>6 They adopted a different strategy in one</p> <p>7 important respect, and that concerned how to deal</p> <p>8 with the Terry paper and the various components of</p> <p>9 the Terry paper. And with all due respect to this</p> <p>10 team, I don't think that there -- theirs was in</p> <p>11 error. I prefer my approach that maintained the</p> <p>12 integrity of the pooled analysis, which has some</p> <p>13 advantages. But there's -- you know, I wouldn't</p> <p>14 expect any large differences on the bottom line</p> <p>15 estimates from their strategy or my strategy. And</p> <p>16 the bottom line results were very similar.</p> <p>17 They -- also in the previous version,</p> <p>18 their evaluation of dose-response was, in my view,</p> <p>19 deficient in not devoting adequate weight to what</p> <p>20 I think is the most important evidence around</p> <p>21 dose-response in this area, which is the Terry</p> <p>22 pooled analysis. They focused on studies which</p> <p>23 provided results by duration of exposure and by</p> <p>24 frequency of exposure. And I think it's the</p> <p>25 combination of those two which is the most</p>

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<p>1 important metric.</p> <p>2 And the fact that the Terry analysis was</p> <p>3 able to combine an enormous dataset for evaluating</p> <p>4 dose-response, much greater than any of the</p> <p>5 studies looking at duration or any of the studies</p> <p>6 looking at frequency, meant that in my view they</p> <p>7 missed an opportunity to properly evaluate</p> <p>8 dose-response by cumulative exposure.</p> <p>9 I note very recently that they have --</p> <p>10 they've now used a different statistical procedure</p> <p>11 for evaluating dose-response by duration and</p> <p>12 frequency, which is embodied in their Table 3,</p> <p>13 which I don't fully understand. It seemed -- this</p> <p>14 was the new part of this study, which I haven't --</p> <p>15 I looked quickly in the method section to see a</p> <p>16 description of exactly what they did, and I</p> <p>17 couldn't find it, but I don't deny that it's</p> <p>18 somewhere in the article. I just haven't had time</p> <p>19 to properly evaluate that part of it.</p> <p>20 Q As you sit here today, do you have any</p> <p>21 criticisms of the statistical analysis that they</p> <p>22 performed?</p> <p>23 A All of it? You're referring to all of</p> <p>24 it? Well, I --</p> <p>25 MS. PARFITT: Objection. Form.</p>	<p>1 That's 2016. Okay.</p> <p>2 Q Dr. Siemiatycki, if you could just</p> <p>3 identify for the record where you're looking so I</p> <p>4 can follow along and the record reflects it.</p> <p>5 A Right. I'm looking in my report of 2018</p> <p>6 in the appendix, page 103, Appendix B.</p> <p>7 Q So looking at Appendix B, which also</p> <p>8 helpfully compares Penninkilampi as well, are</p> <p>9 there studies specifically focused on the Berge</p> <p>10 2018 that in your opinion the authors should have</p> <p>11 included in their meta-analysis?</p> <p>12 MS. PARFITT: Objection. Form.</p> <p>13 THE WITNESS: Okay. Well, just</p> <p>14 following this table, I see that Gates 2008 was in</p> <p>15 my report, but not in theirs. Now, it wasn't in</p> <p>16 my main analysis; it was in one of my sensitivity</p> <p>17 analyses. So I have no -- my main analysis and</p> <p>18 their main analysis concurred about Gates.</p> <p>19 The next one that I see that was in my</p> <p>20 analysis but not in theirs was what I call</p> <p>21 Schildkraut B. And Schildkraut B, for the record,</p> <p>22 is -- there's no such study, but I've named it</p> <p>23 Schildkraut B. It's the result of the analysis of</p> <p>24 the Schildkraut study of cases that were</p> <p>25 interviewed before 2014, I think it was.</p>
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<p>1 THE WITNESS: I note that their bottom</p> <p>2 line meta-relative risk is lower than the one that</p> <p>3 I estimated. And I'm not sure why that is. To me</p> <p>4 the -- the difference in -- the minor differences</p> <p>5 in the studies included or excluded is not</p> <p>6 sufficient to explain that, and I wonder if it's a</p> <p>7 software issue, of them having used a different</p> <p>8 software for meta-analysis than I used. But it's</p> <p>9 not a criticism necessarily. I just note this</p> <p>10 discrepancy.</p> <p>11 BY MS. BRANSCOME:</p> <p>12 Q Are there any studies that you included</p> <p>13 in your meta-analysis in 2018 that the Berge</p> <p>14 authors failed to consider that you think they</p> <p>15 should have included?</p> <p>16 A So I'll go back to my report, because I</p> <p>17 do have a table outlining that in my report.</p> <p>18 MS. PARFITT: You want your report?</p> <p>19 THE WITNESS: Yeah, my report, back to</p> <p>20 my report.</p> <p>21 MS. PARFITT: Let me get you that.</p> <p>22 BY MS. BRANSCOME:</p> <p>23 Q And we'll take a break after we finish</p> <p>24 this paper.</p> <p>25 A Thank you.</p>	<p>1 BY MS. BRANSCOME:</p> <p>2 Q And we will discuss that in more detail,</p> <p>3 but do you consider it an error for the Berge</p> <p>4 authors to just have taken the Schildkraut 2016</p> <p>5 data as a whole?</p> <p>6 A No, I don't consider it an error. In</p> <p>7 fact, I used it -- not in my main analysis but in</p> <p>8 one of my sensitivity analyses.</p> <p>9 The same with Shushan. So Shushan '96</p> <p>10 was in my -- one of my sensitivity analyses, not</p> <p>11 in my main analysis, and they did not include it</p> <p>12 in their main analysis. So we agreed on the main</p> <p>13 analyses there.</p> <p>14 Terry, I included in mine, and they</p> <p>15 didn't include Terry. They included the component</p> <p>16 parts of Terry.</p> <p>17 So there was no -- there was no study</p> <p>18 that was in my main analysis that was not in</p> <p>19 theirs.</p> <p>20 Q Okay. And looking quickly back at the</p> <p>21 Berge article, coming full circle to the question</p> <p>22 that I started with, if you could look on page 253</p> <p>23 of that paper.</p> <p>24 MS. PARFITT: Yes, 253.</p> <p>25 BY MS. BRANSCOME:</p>

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<p>1 Q Under the Discussion section, do you see 2 where I am? 3 A Yes, I do. 4 Q All right. The second paragraph under 5 Discussion from the Berge paper states: "This 6 meta-analysis suggests that genital powder use is 7 associated with a small increased risk of 8 developing ovarian cancer. However, this positive 9 association appears to be limited to the serous 10 histological type and to case-control studies." 11 Did I read that correctly? 12 A You read it correctly. 13 Q It continues on: "This estimate is 14 somewhat lower than that of previous 15 meta-analysis," and in parentheses, it refers 16 specifically to Huncharek and Langseth, colon, "In 17 our cumulative meta-analysis, we confirmed the 18 trend toward lower overall risk estimates as more 19 evidence accumulated." 20 First, did I read that correctly? 21 A You read it correctly. 22 Q Do you have any basis to disagree with 23 the statement by the Berge authors in this 24 paragraph in the Discussion section? 25 MS. PARFITT: Objection. Form.</p>	<p>1 BY MS. BRANSCOME: 2 Q Based on the evidence that's available 3 today, do you think there is strong enough 4 epidemiological evidence to reach a conclusion 5 about the association between talc -- genital talc 6 use and other specific subtypes of ovarian cancer? 7 A I think it becomes very fragile to draw 8 inferences about other types. And in the absence 9 of reliable evidence about other types, you know, 10 especially those that have a smaller fraction of 11 all ovarian cancers than serous type, I think the 12 prudent thing to do is to consider that all 13 ovarian cancers are affected the same way. 14 The same way as with -- we do with lung 15 cancer and smoking and histologic types of lung 16 cancer. While there is some variability in the 17 degree of relative risk between smoking and 18 adenocarcinoma or squamous cell carcinoma or other 19 types, small cell, large cell, for lung cancer, 20 there is some variability in the degree of 21 relative risk. Generally speaking, we say smoking 22 causes cancer. Smoking causes all kinds of -- 23 causes lung cancer, all kinds of lung cancer. 24 Q Are you qualified to evaluate the 25 reasonableness of making an extrapolation from one</p>
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<p>1 THE WITNESS: So there are a few 2 statements in this paragraph, not just one. 3 Do you want me to take them one by one? 4 BY MS. BRANSCOME: 5 Q Sure. 6 A So whether "the positive association 7 appears to be limited to the serous histological 8 type," I have some problem with that. I -- I was 9 looking in their publication for which studies -- 10 let me just see if I can -- which studies provided 11 evidence on serous type, and I couldn't find that. 12 In my -- in my analysis, the evidence 13 that I was able to -- to compile that's in this 14 addendum and meta-analyze showed an approximately 15 similar meta-relative risk between serous and all 16 ovarian cancers. 17 So there is no -- I found no evidence 18 that this -- that there was a particular peak of 19 risk for serous types compared to other types. 20 Q As you sit here today -- 21 MS. PARFITT: Are you done -- are you 22 done with your -- is that -- 23 THE WITNESS: Yeah, for -- for that 24 point on serous, yes. 25 MS. PARFITT: Thank you.</p>	<p>1 subtype of ovarian cancer to all types of ovarian 2 cancer in terms of what is biologically plausible? 3 MS. PARFITT: Objection to form. 4 THE WITNESS: My inferences would be 5 based on the statistical and epidemiological 6 evidence, and if there is biological, 7 physiological evidence that would indicate that 8 talcum powder is more likely to influence one type 9 of ovarian cancer than another, I would be 10 absolutely open to that interpretation. 11 BY MS. BRANSCOME: 12 Q All right. So moving along in that 13 paragraph, are there -- 14 A Okay. 15 Q -- any other sentences or portions of 16 sentences with which you disagree? 17 A So, the statement about case-control 18 studies and whether the positive association is 19 limited to case-control studies is -- is a bit 20 contentious. And I understand very well that the 21 evidence does not -- if we only had the cohort 22 studies, if that's all the evidence that existed, 23 it would be fair to say that that evidence does 24 not argue for an association with -- between 25 ovarian cancer and -- so I would -- I'm not -- I</p>

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<p>1 guess if I were writing this, I would qualify it 2 somehow, and -- no, I think I'll just leave -- 3 leave that there, and you may have follow-up 4 questions about the case-control/cohort 5 comparison. 6 Q Is there anything else in this paragraph 7 in the Discussion section of Berge 2018 with which 8 you disagree? 9 MS. PARFITT: And can you refer him to 10 the left-hand side of the discussion or the 11 entire -- 12 MS. BRANSCOME: The second full 13 paragraph in the Discussion section. 14 MS. PARFITT: Which starts with "An 15 important." 16 THE WITNESS: So I -- I think what -- 17 BY MS. BRANSCOME: 18 Q No, it begins with "This meta-analysis 19 suggests." 20 A Yeah. Yeah. 21 So your question -- the question is 22 about that sentence that says: "This estimate is 23 somewhat lower. In our cumulative meta-analysis, 24 we confirmed the trend towards lower," da, da, da, 25 and that refers I guess specifically to Figure 4</p>	<p>1 misstates his testimony. 2 THE WITNESS: It requires looking at 3 which studies were included in each of these 4 meta-analyses, and which results were chosen by 5 the meta-analysis people who did these 6 meta-analyses from each paper. The meta-analysis 7 is somewhat sensitive to which studies are 8 selected and -- so the same study might have been 9 selected in the 2004 meta-analysis as in the 2016, 10 but they chose -- they decided to choose an 11 estimate from -- a result from that paper that 12 they thought was the most reasonable one and 13 that's different. 14 So one would have to do side-by-side 15 comparisons of which studies were included and 16 which results before concluding that this is 17 because of a downward trend. You also need to 18 know when the data were collected. 19 You know, I'm not sure if the -- if you 20 are implying or if they are implying that -- you 21 know, I -- a declining trend, if there is one, in 22 meta-analyses -- these are the years of the 23 meta-analysis, not the years that women were 24 exposed. So there's no implication -- direct 25 implication here that the risks to women are</p>
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<p>1 on the following page. 2 Certainly the confidence intervals, if 3 you look at the confidence intervals of the 4 meta-estimates in that Figure 4, from 1988 through 5 2016, everything is embedded in everything. So 6 from the point of view of statistical variability, 7 it would be difficult to argue that there is a 8 real statistical -- statistically meaningful 9 difference between the trendline from -- through 10 that whole period. 11 There is a tendency by eye for a 12 decline. I don't know in their paper, in the text 13 whether they've characterized the decline with any 14 regression coefficients or not. I don't remember. 15 It seems to me like a rather weak trend to make a 16 big point about. So I wouldn't disagree with 17 the -- the point they're making, but I think it's 18 not strongly supported. There isn't a strong 19 trend downwards in this line, in this figure. 20 Q So you would agree with the authors that 21 there is a downward trend in the risk assessment 22 over time as more evidence accumulated, but you 23 might disagree with them about the strength of 24 that trend. Is that fair? 25 MS. PARFITT: Objection. Form,</p>	<p>1 declining over time. So if it's only the fact 2 that meta-analyses carried out at different points 3 in time showed very slightly different results, I 4 don't find that a noteworthy observation. But... 5 BY MS. BRANSCOME: 6 Q And you agree that meta-analyses are 7 sensitive to the judgments applied by the authors 8 of those studies, correct? 9 A Yes, they are, but to -- to a degree. I 10 mean you have to weigh the -- the degree of 11 bias -- or not the bias, but the -- the influence 12 of particular decisions that you might make. 13 I've done an analysis looking at what 14 happens when you include or exclude studies, and 15 you could exclude any study from my meta-analysis 16 and you'd find the same result. So if any of 17 these studies in my meta-analysis are completely 18 wrong, if they were completely invented, if the 19 women were never actually interviewed but the 20 investigator just wrote a paper on a Sunday 21 afternoon, and you're suspicious that this study 22 was -- or badly -- whatever, if you take any one 23 of these studies and take it out of the mix, it 24 wouldn't affect the meta-relative risk. 25 MS. BRANSCOME: Okay. I think this is a</p>

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<p>1 good place to take a break.</p> <p>2 MS. PARFITT: Very good. Thank you.</p> <p>3 THE VIDEOGRAPHER: We're going off the</p> <p>4 record at 5:07 p.m.</p> <p>5 (Recess.)</p> <p>6 THE VIDEOGRAPHER: This begins disc</p> <p>7 number 5 in the deposition of Jack Siemiatycki.</p> <p>8 We're going back on the record at 5:36 p.m.</p> <p>9 BY MS. BRANSCOME:</p> <p>10 Q One of the decisions that you had to</p> <p>11 make in conducting your meta-analysis was how to</p> <p>12 treat the Schildkraut 2006 study, correct?</p> <p>13 A 2000 --</p> <p>14 Q -- '16.</p> <p>15 A Thank you. Yes.</p> <p>16 Q Okay. For purposes of your</p> <p>17 meta-analysis, you divided Schildkraut 2016 into</p> <p>18 two sets of results, correct?</p> <p>19 A "Divided" isn't quite the right word.</p> <p>20 Q How would you describe it?</p> <p>21 A Because they're not separate, one</p> <p>22 includes the other.</p> <p>23 Q Okay.</p> <p>24 A So just the word "divided" -- I'm not</p> <p>25 sure what the right word is, but there were two</p>	<p>1 Q But if it's your preference to look at</p> <p>2 the paper now, it is tab 15.</p> <p>3 A It's in this binder, I think.</p> <p>4 MS. PARFITT: Here it is. Thank you.</p> <p>5 THE WITNESS: Thank you.</p> <p>6 Okay. The -- so one includes all --</p> <p>7 Schildkraut A includes all of the cases</p> <p>8 interviewed the whole period, and the</p> <p>9 Schildkraut B includes cases after 2014, but I'm</p> <p>10 not sure if it includes 2014. But...</p> <p>11 BY MS. BRANSCOME:</p> <p>12 Q Let me ask a clarification on that one,</p> <p>13 Dr. Siemiatycki.</p> <p>14 Schildkraut 2016-B shows results for</p> <p>15 individuals interviewed before 2014, correct?</p> <p>16 A I'm sorry, which one, B? Schildkraut B?</p> <p>17 Q Schildkraut 2016-B.</p> <p>18 A B.</p> <p>19 Q I believe you just stated after, so I --</p> <p>20 A I see. Okay.</p> <p>21 Q -- wanted to seek clarification there.</p> <p>22 A Okay. Yeah, I'm --</p> <p>23 Q If it's helpful --</p> <p>24 A It's late in the day. Let me --</p> <p>25 Q Sure. If it's helpful to you to</p>
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<p>1 sets of results reported, and I used both sets of</p> <p>2 results. One is embedded -- one set is embedded</p> <p>3 in the other.</p> <p>4 Q So correct me if I'm wrong, Schildkraut</p> <p>5 2016-A shows results from all subjects who were</p> <p>6 interviewed in the study from 2010 through 2015.</p> <p>7 Schildkraut 2016-B is a subset of that that</p> <p>8 includes the results for subjects who were</p> <p>9 interviewed before 2014, correct?</p> <p>10 MS. PARFITT: And, Counsel, if we could</p> <p>11 get Schildkraut in front of him, would that be all</p> <p>12 right?</p> <p>13 MS. BRANSCOME: Sure.</p> <p>14 BY MS. BRANSCOME:</p> <p>15 Q If you need to reference it --</p> <p>16 MS. PARFITT: Sure.</p> <p>17 BY MS. BRANSCOME:</p> <p>18 Q -- to answer my questions, certainly.</p> <p>19 A If you're going -- yes, I think you're</p> <p>20 right in what you said, but if you want me to look</p> <p>21 at specific results in the paper, maybe I should</p> <p>22 have it in front of me.</p> <p>23 Q I was going to direct you there when we</p> <p>24 got to those questions.</p> <p>25 A Okay.</p>	<p>1 reference in your report, you discuss your</p> <p>2 separation of Schildkraut on page 74, Note 6.</p> <p>3 A That's why I wanted my report in a small</p> <p>4 binder, rather than -- before 2014, yes.</p> <p>5 Q And the reason that you divided --</p> <p>6 separated the study into those two groups, one</p> <p>7 which is inclusive of the other, is to account for</p> <p>8 the possibility that publicity surrounding two</p> <p>9 class action lawsuits on talc and ovarian cancer</p> <p>10 in 2014 may have induced bias in the validity of</p> <p>11 reporting talc exposure; is that correct?</p> <p>12 A That's correct.</p> <p>13 Q Okay. But in your main meta-analysis</p> <p>14 you use Schildkraut A, which includes all subjects</p> <p>15 interviewed from 2010 to 2015, correct?</p> <p>16 A That's correct.</p> <p>17 Q When you substituted Schildkraut B,</p> <p>18 which included only subjects interviewed before</p> <p>19 2014, for Schildkraut A, all subjects interviewed</p> <p>20 from 2010 to 2015, the relative risk estimate for</p> <p>21 the meta-analysis goes down, correct?</p> <p>22 A Yes. From 1.28 to 1.27.</p> <p>23 MS. BRANSCOME: If we could mark</p> <p>24 Schildkraut as Exhibit 13.</p> <p>25 THE WITNESS: There's a label here</p>

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<p style="text-align: right;">Page 214</p> <p>1 already.</p> <p>2 MS. PARFITT: There is. I will go ahead</p> <p>3 and just -- you don't care -- there's a defense</p> <p>4 label of 1436. Can I go ahead and put the exhibit</p> <p>5 over top of it? Does it matter to you? Okay.</p> <p>6 This will be 13.</p> <p>7 (Exhibit No. 13 was marked for</p> <p>8 identification.)</p> <p>9 BY MS. BRANSCOME:</p> <p>10 Q All right. If you could,</p> <p>11 Dr. Siemiatycki, please turn to Table 2, which is</p> <p>12 on page 1414 of Exhibit 13.</p> <p>13 A I see it.</p> <p>14 Q Before doing that, can you just simply</p> <p>15 confirm that Exhibit 13 is in fact the Schildkraut</p> <p>16 study?</p> <p>17 A Yes, it is.</p> <p>18 Q And we see in Table 2 that there is a</p> <p>19 category for interview date less than 2014, and</p> <p>20 then another category for interview date greater</p> <p>21 than 2014. Correct?</p> <p>22 A Yes, I see that.</p> <p>23 Q All right. And we see that there are</p> <p>24 odds ratios for any genital use for both of these</p> <p>25 categories, correct?</p>	<p style="text-align: right;">Page 216</p> <p>1 A Yes, that's correct.</p> <p>2 Q All right. And the -- those are for the</p> <p>3 cases, meaning individuals who had been diagnosed</p> <p>4 or reported as diagnosed with ovarian cancer,</p> <p>5 correct?</p> <p>6 A Correct.</p> <p>7 Q And if you compare that against the</p> <p>8 controls, 34 percent is the reported number for</p> <p>9 women without ovarian cancer who reported any</p> <p>10 genital use of talcum powder that were interviewed</p> <p>11 before 2014, correct?</p> <p>12 A That's correct.</p> <p>13 Q And if we look at those same</p> <p>14 percentages for the individuals who were</p> <p>15 interviewed after 2014, the percentage of cases,</p> <p>16 meaning individuals who have been diagnosed or</p> <p>17 reported as diagnosed with ovarian cancer who</p> <p>18 claim to have used talc genitally at any point in</p> <p>19 time, goes up to 51.5 percent compared to a</p> <p>20 control of 34.4 percent, correct?</p> <p>21 A That's correct.</p> <p>22 Q All right. And so if we compare</p> <p>23 individuals interviewed before 2014 who have been</p> <p>24 diagnosed or reported as diagnosed with ovarian</p> <p>25 cancer to those individuals in the same category</p>
<p style="text-align: right;">Page 215</p> <p>1 A Yes, I see that.</p> <p>2 Q And the odds ratio for any genital use</p> <p>3 for individuals who were interviewed after 2014 is</p> <p>4 higher than the odds ratio for any genital use for</p> <p>5 those individuals who were interviewed before</p> <p>6 2014, correct?</p> <p>7 A That's correct.</p> <p>8 Q And it also shows the number of</p> <p>9 individuals that fell in those respective</p> <p>10 categories, correct?</p> <p>11 A Yes, correct.</p> <p>12 Q And so just simply looking at the</p> <p>13 reported data, the percentage of women with --</p> <p>14 with ovarian cancer who reported any genital use</p> <p>15 of talc who were interviewed before 2014 was</p> <p>16 36.5 percent, correct?</p> <p>17 A Can you run that by me again? Show me</p> <p>18 where the --</p> <p>19 Q Sure.</p> <p>20 A So interview date before 2014, any</p> <p>21 genital use, the percentage 36.5, number 128, is</p> <p>22 that what --</p> <p>23 Q Yes.</p> <p>24 A -- you are looking at? Okay.</p> <p>25 Q Was that correct?</p>	<p style="text-align: right;">Page 217</p> <p>1 who were interviewed after 2014, you see at least</p> <p>2 a 12 percent increase in those figures; is that</p> <p>3 correct?</p> <p>4 A 12 percent representing which -- which</p> <p>5 two numbers?</p> <p>6 Q Representing the difference between the</p> <p>7 cases who reported genital use of talcum powder --</p> <p>8 A The 36.5?</p> <p>9 Q -- as compared to the 51.5 percent.</p> <p>10 A So you -- you said it's 12 percent? I</p> <p>11 think it's like 14 percent.</p> <p>12 Q It is.</p> <p>13 A Okay.</p> <p>14 Q That is correct.</p> <p>15 But if you do the same comparison for</p> <p>16 the control group, you don't see a similar</p> <p>17 increase or a similar difference in the reporting</p> <p>18 percentages for individuals interviewed before</p> <p>19 2014 as after 2014, correct?</p> <p>20 A That's correct.</p> <p>21 Q Okay. Are those results compatible with</p> <p>22 the existence of recall bias for individuals</p> <p>23 interviewed after 2014?</p> <p>24 A I would say they are compatible with</p> <p>25 recall bias.</p>

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<p style="text-align: right;">Page 218</p> <p>1 Q Okay. Was litigation-related recall 2 bias considered by IARC as a possible bias that 3 could explain the association between perineal 4 talc use and ovarian cancer? 5 A In 2006? 6 Q Correct. 7 A I -- I can't remember verbatim the 8 discussions, and I can't remember a discussion of 9 litigation-related impact on response bias. I 10 doubt if there would have been any at that time, 11 but -- and I don't recall any discussion of it. 12 Q And at least the Schildkraut authors are 13 identifying 2014 as a significant year with 14 respect to widespread knowledge of lawsuits 15 involving talcum powder and a claim of ovarian 16 cancer -- 17 MS. PARFITT: Objection. Form. 18 BY MS. BRANSCOME: 19 Q -- correct? 20 MS. PARFITT: Objection. Form. 21 THE WITNESS: I -- if you may, I think 22 what they refer to is localized publicity, not 23 widespread publicity. 24 BY MS. BRANSCOME: 25 Q If you can, can you refer me to the</p>	<p style="text-align: right;">Page 220</p> <p>1 column seems to suggest that data was collected 2 from a number -- 3 A Oh. 4 Q -- of different states across the United 5 States, correct? 6 A Correct. Correct. 7 Q And so at least based on your review as 8 you sit here today, the authors do not seem to 9 have limited the potential effect of publicity of 10 the class action lawsuits to a precise region, 11 correct? 12 A That seems to be the case. 13 Q Okay. 14 A Yes. 15 Q And so your understanding or your 16 testimony earlier that the publicity was only 17 localized, you're not able to point me to anything 18 in the article to support that, correct? 19 A That's correct. 20 Q And in fact, in the two portions of the 21 Schildkraut article that discuss the publicity, 22 there is no specific reference to it being limited 23 to an area, correct? 24 MS. PARFITT: Objection. Form. 25 THE WITNESS: In the two -- sorry.</p>
<p style="text-align: right;">Page 219</p> <p>1 language in the paper that references that. 2 A So I see a mention of it in the -- on 3 page 1412, second column, last paragraph, about 4 seven or eight lines from the bottom, the sentence 5 beginning: "Two class action lawsuits were filed 6 in 2014 concerning possible carcinogenic effects 7 of body powder, which may have influenced recall." 8 Now, there's a reference there, but the 9 reference doesn't indicate where those class 10 actions were. And now I'm going to look in the 11 Discussion section to see if there's any 12 indication. If anyone knows whether there is or 13 if there is not -- I haven't looked for this 14 specifically. I just have a vague memory of them 15 referring to localized publicity, but... (peruses 16 document.) 17 Well, in my very quick scanning, I don't 18 see reference to these being local. You people 19 might know whether these two lawsuits that they 20 refer to in the Reference section, whether they 21 were local in this area. And this is North 22 Carolina, is it? 23 Q Well, so that's -- that's a question I 24 have for you, Dr. Siemiatycki. On page 1412, the 25 paragraph -- the last full paragraph on the second</p>	<p style="text-align: right;">Page 221</p> <p>1 BY MS. BRANSCOME: 2 Q So there's one discussion of the 3 potential public -- the potential effect of 4 publicity, which is on page 1412. 5 A Yeah. 6 Q And then there is a second discussion of 7 it on page 1416 -- 8 A Yes. 9 Q -- in the Discussion section, and 10 neither of those two sections talk about awareness 11 of the class action lawsuits being limited to a 12 specific geographic region, correct? 13 A That's correct. 14 Q In fact, the language that the authors 15 use is a heightened awareness of the exposure as a 16 result of two recent class action lawsuits, and 17 they discuss just publicity, correct? 18 A Yes, I think so. 19 Q Okay. Are you relying -- 20 A In that second paragraph in the 21 discussion, the authors seem to discount the -- 22 the recall bias hypothesis or to minimize it, and 23 I -- I -- I don't support -- or the opposite of 24 what they're saying. I just note that they don't 25 seem to be enthusiastic about that hypothesis that</p>

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<p>1 it's strictly due to response bias.</p> <p>2 But go ahead and --</p> <p>3 Q The authors do recognize, though, that</p> <p>4 there is a possibility of recall bias may have</p> <p>5 caused some inflation of the odds ratios, correct?</p> <p>6 A Yes.</p> <p>7 MS. PARFITT: Wait, that's part --</p> <p>8 that's part of the sentence. Objection.</p> <p>9 THE WITNESS: Yeah. Yeah.</p> <p>10 BY MS. BRANSCOME:</p> <p>11 Q Are you relying on Penninkilampi 2018</p> <p>12 for your opinions in this litigation?</p> <p>13 A My opinions were informed before I knew</p> <p>14 about that article.</p> <p>15 Q Do you believe that the Penninkilampi</p> <p>16 2018 study supports your conclusions in this</p> <p>17 litigation?</p> <p>18 A It's consistent with my conclusions. A</p> <p>19 little bit like Berge, the fact that they didn't</p> <p>20 pick up any studies that I hadn't -- that I had</p> <p>21 not picked up reassures me that there was nothing</p> <p>22 amiss in my search of the literature.</p> <p>23 There were some differences in which</p> <p>24 studies they included in their meta-analysis and</p> <p>25 which data. I'm happy with the decisions -- the</p>	<p>1 impact on the bottom line result. Some errors</p> <p>2 might have large effects, so it would depend what</p> <p>3 the errors were.</p> <p>4 But since his studies were mostly the</p> <p>5 same as the ones I had used and the same ones that</p> <p>6 Berge had used, and since the results that he had</p> <p>7 taken out of those studies were mostly the same</p> <p>8 ones I had taken out and that Berge had taken out,</p> <p>9 I fully expected his bottom line meta-analysis to</p> <p>10 produce the same results.</p> <p>11 BY MS. BRANSCOME:</p> <p>12 Q The Penninkilampi study does not</p> <p>13 consider or include the Gates 2010 cohort study,</p> <p>14 correct?</p> <p>15 A Correct.</p> <p>16 Q Do you think Gates 2010 - and if you</p> <p>17 would prefer to refer to Penninkilampi, it is</p> <p>18 tab 20.</p> <p>19 A Yeah.</p> <p>20 Q In your opinion, is --</p> <p>21 MS. PARFITT: I have a clean one right</p> <p>22 here with the -- if we use two books, we can do it</p> <p>23 to save time, but --</p> <p>24 THE WITNESS: Sorry?</p> <p>25 MS. PARFITT: Do you want that?</p>
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<p>1 judgments I had made about it. So there are some</p> <p>2 minor variations there. But essentially they</p> <p>3 found the same thing that I found, because we're</p> <p>4 all working with the same data.</p> <p>5 Q Okay. Did you do an independent</p> <p>6 verification that the data Penninkilampi reports</p> <p>7 in his article is indeed accurate?</p> <p>8 MS. PARFITT: Objection. Form.</p> <p>9 THE WITNESS: By the data, you mean the</p> <p>10 results that he put into his meta-analysis?</p> <p>11 BY MS. BRANSCOME:</p> <p>12 Q For example, did you look at the</p> <p>13 reported data in the tables in the Penninkilampi</p> <p>14 article and compare it to the underlying studies</p> <p>15 to see if they matched?</p> <p>16 A I don't recall doing that comparison.</p> <p>17 I'm not sure why I would want to.</p> <p>18 Q If there were errors in the reporting of</p> <p>19 any of the odds ratios or confidence intervals in</p> <p>20 the Penninkilampi 2018 paper, would that call into</p> <p>21 reliability the meta-analysis, in your opinion?</p> <p>22 MS. PARFITT: Objection. Form.</p> <p>23 THE WITNESS: It depends on the nature</p> <p>24 of the errors. If there was one decimal point</p> <p>25 typo sort of thing, it would have absolutely no</p>	<p>1 THE WITNESS: No. I'm actually looking</p> <p>2 for my copy of the Gates 2010.</p> <p>3 You're going to ask me about his use</p> <p>4 of -- Gates 2010?</p> <p>5 BY MS. BRANSCOME:</p> <p>6 Q I was simply just going to ask you, is</p> <p>7 Gates 2010 a significant study, in your opinion,</p> <p>8 to leave out of a meta-analysis on this topic?</p> <p>9 MS. PARFITT: Objection. Form.</p> <p>10 THE WITNESS: A significant study.</p> <p>11 It -- in my view there are flaws with that study,</p> <p>12 but there are flaws with many epidemiologic</p> <p>13 studies. It's not -- that's not a reason to</p> <p>14 exclude them. I would include it but take note of</p> <p>15 the flaws, including the fact that their reference</p> <p>16 category for their odds ratios for their relative</p> <p>17 risk estimates was not an unexposed group, but it</p> <p>18 was a group that combined women who had never used</p> <p>19 talc with women who had used it occasionally.</p> <p>20 BY MS. BRANSCOME:</p> <p>21 Q Are there any other errors in the Gates</p> <p>22 2010 study? And if you'd like to refer to it --</p> <p>23 MS. PARFITT: Thank you.</p> <p>24 THE WITNESS: Okay. Let me find my copy</p> <p>25 of -- yeah, here we are -- Gates 2010.</p>

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<p style="text-align: right;">Page 226</p> <p>1 Well, yes, there are some flaws with it, 2 but they're related to the fact that this builds 3 on the Nurses' Health Study, which is a good and 4 well deservedly recognized, good prospective 5 cohort study which focused on many factors in 6 women's lives, including predominantly nutritional 7 reproductive, hormonal factors, and all kinds of 8 diseases, all heart disease, diabetes, et cetera, 9 et cetera. There have been hundreds and hundreds 10 of publications that have come out of it. 11 Their collect- -- the collection of talc 12 information in the Nurses' Health Study was very 13 weak. The questionnaire was conducted in 1982. 14 It was part of a biannual follow-up mailed 15 questionnaire. The question itself and the 16 structure of the question itself I find very weak 17 from the point of view of designing questions for 18 questionnaires. I mean, I -- I could read it into 19 the record, but it's in the -- it's in the -- it's 20 quoted in the Gertig paper, and it's actually -- 21 I've seen that page of the questionnaire, and 22 it's -- I find it ambiguous as to how women would 23 answer that question. 24 And it's only one question for that 25 point in time. There was never any follow-up. So</p>	<p style="text-align: right;">Page 228</p> <p>1 authors of the Penninkilampi 2018 publication? 2 A No, I don't. 3 Q Do you know or have any information 4 about the source or sources of funding for the 5 Penninkilampi article? 6 A No, I don't, no. I -- I would add, 7 though, that the inclusion or exclusion of Gates 8 2010 probably didn't affect the bottom line result 9 of their meta-analysis by more than 0.01 decimal 10 point of the odds ratio. 11 Q But did they publish any type of 12 sensitivity analysis that would let you 13 specifically draw that conclusion? 14 A Well, I -- I have done one myself where 15 I dropped each of the studies in order to see what 16 would be the impact if that study had been 17 dropped. And there's hardly -- no study has more 18 than a 1 decimal -- you know, 0.01 decimal point 19 on the odds ratio. 20 So we could argue about the merits of 21 any of these studies or demerits, but the impact 22 of including them or excluding an individual study 23 is pretty minimal. 24 Q Shushan 1996 is one of the studies you 25 did not include in your main meta-analysis,</p>
<p style="text-align: right;">Page 227</p> <p>1 between 1982 and 2007 or so, when the follow-up of 2 the -- for the Gates analysis ended, they had no 3 idea whether women were exposed -- whether women 4 who had been exposed in 1982 were in exactly the 5 same exposure category in 1990, in 2000, in 2005 6 and so on. They made the assumption that women's 7 exposure status was stable for 25 years. And so 8 that's a major weakness of the analysis of talc 9 and ovarian cancer in -- from this study. 10 BY MS. BRANSCOME: 11 Q So in your view, was it proper for the 12 Penninkilampi authors to leave Gates 2010 out of 13 their meta-analysis? 14 A That's not what I said. That's not what 15 I said. 16 I -- I think to go down the road of 17 making value judgments about each of these studies 18 and including them or not including them would end 19 up in the need for many days of deposition and 20 cross-examination, because each of those -- any 21 decision about any study can be argued umpteen 22 ways. And that's why I took the decision early on 23 not to make exclusions based on my judgment of the 24 quality of the study. 25 Q Do you personally know any of the</p>	<p style="text-align: right;">Page 229</p> <p>1 correct? 2 A Correct. 3 Q And you reported that you did not 4 include it because the report was quite cryptic 5 regarding the data collection and the talc 6 exposure variable, correct? 7 A That's correct. 8 Q What did you mean by the report was 9 quite cryptic regarding the data collection? 10 A So I have to take a couple of minutes to 11 review that -- to look at that paper to answer 12 your question. 13 Well, so the first thing that strikes 14 me -- and I haven't read the description of how 15 they collected the data. The first thing that 16 strikes me is they have a table, Table 2 on 17 page 15, with some information about these various 18 variables, including talc exposure. And the two 19 categories of talc exposure that they describe in 20 this table, one is called "Never - seldom," and 21 the other one is called "Moderate - a lot." I 22 don't know what that means. So that's one 23 element -- how they present it and how they 24 analyze the data. 25 But I think actually how they collected</p>

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<p style="text-align: right;">Page 230</p> <p>1 the data also led me to describe the -- the</p> <p>2 information on exposure as being cryptic.</p> <p>3 Q Okay. Are you familiar with the 2018</p> <p>4 paper by Mohamed Taher and others entitled "The</p> <p>5 systematic review and meta-analysis: The</p> <p>6 association between perineal use of talc and risk</p> <p>7 of ovarian cancer"?</p> <p>8 A Yes, I am.</p> <p>9 Q Okay. Have you read the Taher 2018</p> <p>10 manuscript?</p> <p>11 A Yes. I haven't read all the appendices,</p> <p>12 but I basically read enough that I know what's in</p> <p>13 it.</p> <p>14 Q Did you have access to the Taher 2018</p> <p>15 article before it was published?</p> <p>16 A I don't think it's been published.</p> <p>17 Q How did you get access to the Taher</p> <p>18 manuscript and the appendices?</p> <p>19 A I heard about -- I first heard about the</p> <p>20 Canadian Department of Health advisory, or</p> <p>21 whatever the word is, about talc and ovarian</p> <p>22 cancer in the public media. And I -- I think in</p> <p>23 the news report that I saw, there was a reference</p> <p>24 to Taher -- the Taher paper. That's how I first</p> <p>25 learned about something by them.</p>	<p style="text-align: right;">Page 232</p> <p>1 Q Which author do you know?</p> <p>2 A Daniel Krewski.</p> <p>3 Q You have published many papers with, is</p> <p>4 it, Dr. Krewski?</p> <p>5 A Yes.</p> <p>6 Q Is that correct?</p> <p>7 A Yes. Yes, it is.</p> <p>8 Q How many papers have you published with</p> <p>9 him?</p> <p>10 A I'll look at my CV and count.</p> <p>11 Q Would it be fair to say over 20?</p> <p>12 A Oh, I would be surprised if it was that</p> <p>13 high. But if you've counted, I won't contradict</p> <p>14 what you -- what you say.</p> <p>15 Q Let's do it this way: Would all of the</p> <p>16 papers that you have coauthored with Dr. Krewski</p> <p>17 be listed on your CV?</p> <p>18 A Yes.</p> <p>19 Q Have you discussed your opinion on talc</p> <p>20 and ovary -- ovarian cancer with Dr. Krewski?</p> <p>21 A No.</p> <p>22 Q Have you discussed your opinion on talc</p> <p>23 and ovarian cancer with any of the authors of the</p> <p>24 Taher manuscript?</p> <p>25 A No.</p>
<p style="text-align: right;">Page 231</p> <p>1 And I wrote to Ms. Parfitt -- I sent a</p> <p>2 message to Ms. Parfitt asking her if she knows</p> <p>3 anything about this and has that information, and</p> <p>4 she wrote back, I think, and said, No, I thought</p> <p>5 you might have -- know something about it and have</p> <p>6 information.</p> <p>7 MS. PARFITT: And -- and,</p> <p>8 Dr. Siemiatycki, you're not to discuss --</p> <p>9 THE WITNESS: Okay.</p> <p>10 MS. PARFITT: -- discuss our</p> <p>11 communications.</p> <p>12 THE WITNESS: Okay.</p> <p>13 Subsequently, Ms. Parfitt sent me the</p> <p>14 Taher paper.</p> <p>15 BY MS. BRANSCOME:</p> <p>16 Q And when -- when did you first request</p> <p>17 the Taher paper and appendices from Ms. Parfitt?</p> <p>18 A I think in December 2018.</p> <p>19 Q When were you provided with the Taher</p> <p>20 manuscript and the appendices and supplemental</p> <p>21 tables?</p> <p>22 A Within a few days after that.</p> <p>23 Q Do you know personally any of the</p> <p>24 authors on the Taher manuscript?</p> <p>25 A I know one of them.</p>	<p style="text-align: right;">Page 233</p> <p>1 Q Have you spoken to or otherwise</p> <p>2 communicated with Dr. Krewski about your</p> <p>3 involvement as an expert in this litigation?</p> <p>4 A No, I haven't.</p> <p>5 Q Do you know if the Taher manuscript has</p> <p>6 been accepted for publication?</p> <p>7 A I don't know if it's been submitted for</p> <p>8 publication.</p> <p>9 Q Do you know anything about the source or</p> <p>10 sources of funding for the Taher 2018 manuscript?</p> <p>11 A I don't have any privileged information</p> <p>12 about that, but I seem to recall in the manuscript</p> <p>13 they're saying something about funding from Health</p> <p>14 Canada.</p> <p>15 Q Is it fair to say that your knowledge</p> <p>16 with respect to the source or sources of funding</p> <p>17 of the Taher manuscript is limited to what is</p> <p>18 written in the manuscript itself?</p> <p>19 A Yes.</p> <p>20 Q Did you attend the National Cancer</p> <p>21 Institute directors meeting held in Lyon, France,</p> <p>22 on July 11th through 13th, 2018?</p> <p>23 A No, I did not.</p> <p>24 Q Now, the Taher 2018 manuscript contains</p> <p>25 a meta-analysis, correct?</p>

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<p style="text-align: right;">Page 234</p> <p>1 A Correct.</p> <p>2 Q And Taher 2018 calculates an overall</p> <p>3 relative risk of 1.28, correct?</p> <p>4 MS. PARFITT: If we could just get that</p> <p>5 in front of him.</p> <p>6 MS. BRANSCOME: Oh, of course.</p> <p>7 MS. PARFITT: Do you have your copy? I</p> <p>8 appreciate that.</p> <p>9 MS. BRANSCOME: It is tab --</p> <p>10 MS. PARFITT: I think he may have it as</p> <p>11 well and --</p> <p>12 THE WITNESS: I have it --</p> <p>13 MS. PARFITT: Make that a little easier</p> <p>14 and more quicker.</p> <p>15 MR. TISI: Do you want to mark it?</p> <p>16 MS. BRANSCOME: We have already marked</p> <p>17 Dr. Siemiatycki's binder.</p> <p>18 MR. TISI: Okay. We can --</p> <p>19 MS. BRANSCOME: I believe that contains</p> <p>20 the -- the manuscript and the exhibits.</p> <p>21 MS. PARFITT: And that is binder 6,</p> <p>22 Exhibit 6.</p> <p>23 MR. TISI: You said binder, going with</p> <p>24 his or the one --</p> <p>25 MS. PARFITT: Exhibit 6.</p>	<p style="text-align: right;">Page 236</p> <p>1 one in the binders you gave him? That may help.</p> <p>2 MS. BRANSCOME: It's tab 31.</p> <p>3 MS. PARFITT: Thank you.</p> <p>4 Tab 31. I appreciate that.</p> <p>5 No, you can keep yours.</p> <p>6 THE WITNESS: Okay.</p> <p>7 MS. PARFITT: There you go, just for the</p> <p>8 record. Okay. Thank you.</p> <p>9 BY MS. BRANSCOME:</p> <p>10 Q So my question to you, Dr. Siemiatycki,</p> <p>11 is Taher 2018 calculates an overall relative risk</p> <p>12 of 1.28. Is that correct?</p> <p>13 A That's what it says in the abstract,</p> <p>14 yes.</p> <p>15 Q And the confidence interval that they</p> <p>16 report is 1.2 to 1.37, correct?</p> <p>17 A Yes.</p> <p>18 Q So the overall relative risk as well as</p> <p>19 the confidence interval reported in the Taher 2018</p> <p>20 paper is very similar to the overall relative risk</p> <p>21 and confidence interval that you report in your</p> <p>22 analysis for the MDL, correct?</p> <p>23 A That's correct. Which is not</p> <p>24 surprising.</p> <p>25 Q And if you could turn to page 49 of the</p>
<p style="text-align: right;">Page 235</p> <p>1 MS. BRANSCOME: Exhibit 6 is</p> <p>2 Dr. Siemiatycki's copy of the Taher manuscript</p> <p>3 with the appendices and supplemental tables.</p> <p>4 BY MS. BRANSCOME:</p> <p>5 Q Is that correct?</p> <p>6 A That's correct.</p> <p>7 MR. TISI: And that's in his binder,</p> <p>8 Exhibit 6.</p> <p>9 THE WITNESS: I don't -- I didn't bring</p> <p>10 the supplemental tables and appendices with me.</p> <p>11 BY MS. BRANSCOME:</p> <p>12 Q Okay. So could you just describe for</p> <p>13 the record the contents of Exhibit 6. It is</p> <p>14 marked, but just so that I can follow along.</p> <p>15 A This document?</p> <p>16 MR. TISI: No, the whole thing.</p> <p>17 THE WITNESS: Oh, the whole -- the whole</p> <p>18 thing. It contains various meta-analyses, so the</p> <p>19 Berge, Penninkilampi, Huncharek, just the meta --</p> <p>20 main meta-analyses that have been done.</p> <p>21 MS. PARFITT: And, Counsel --</p> <p>22 THE WITNESS: Langseth.</p> <p>23 MS. PARFITT: Right.</p> <p>24 -- in light of the fact he has his in</p> <p>25 front of him, Exhibit 6, is there a corresponding</p>	<p style="text-align: right;">Page 237</p> <p>1 Taher paper. You see the Conclusion section?</p> <p>2 A Yes.</p> <p>3 Q The authors of the Taher paper state in</p> <p>4 the Conclusion section: "Consistent with previous</p> <p>5 evaluations, the IARC in 2010 and subsequent</p> <p>6 evaluations by individual investigators, the</p> <p>7 present comprehensive evaluation of all currently</p> <p>8 available relevant data indicates that perineal</p> <p>9 exposure to talc powder is a possible cause of</p> <p>10 ovarian cancer in humans."</p> <p>11 First, did I read that correctly?</p> <p>12 A Yes.</p> <p>13 Q Okay. Do you agree first that the Taher</p> <p>14 2018 paper represents a comprehensive evaluation</p> <p>15 of all currently available relevant data?</p> <p>16 A Yes. I haven't -- I haven't done the</p> <p>17 same comparison between which studies and which</p> <p>18 data points from each study they used compared to</p> <p>19 the ones that I've used. I did that for the Berge</p> <p>20 and for the Penninkilampi, comparing theirs with</p> <p>21 mine. I haven't done that for theirs. So I -- I</p> <p>22 assume that they used basically the same studies</p> <p>23 and the same results from each study.</p> <p>24 But, you know, to answer -- I'm quite</p> <p>25 sure that they did this comprehensive evaluation</p>

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<p>1 of all currently available, but to answer that</p> <p>2 strictly, I would want to do a comparison of the</p> <p>3 two. But I'm willing to accept.</p> <p>4 Q Okay. And we see here even in this</p> <p>5 sentence that we just read that there's a</p> <p>6 reference there to the IARC publication in 2010.</p> <p>7 We've already discussed that, correct?</p> <p>8 A Yes.</p> <p>9 Q And then there's a reference to</p> <p>10 subsequent evaluations by individual</p> <p>11 investigators, and there's a reference there to</p> <p>12 articles or studies 3, 5 and 69. Do you see that?</p> <p>13 A I see that.</p> <p>14 Q And looking at the reference pages,</p> <p>15 beginning on page 51, would you agree that</p> <p>16 reference 3 is the Berge analysis, this citation</p> <p>17 is to 2017, correct?</p> <p>18 A Correct.</p> <p>19 Q Five is Penninkilampi, correct?</p> <p>20 A Correct.</p> <p>21 Q And the last reference, which is 69, is</p> <p>22 to the Terry meta-analysis. Do you see that?</p> <p>23 A Terry is not a meta-analysis. It's a</p> <p>24 pooled analysis. But I see that, yes.</p> <p>25 Q Okay. So the reference in the Taher</p>	<p>1 Q And that they examined those studies</p> <p>2 closely enough at least to reach the conclusion in</p> <p>3 their own mind that their results were consistent</p> <p>4 with those findings.</p> <p>5 MS. PARFITT: Objection. Form.</p> <p>6 THE WITNESS: Yes.</p> <p>7 BY MS. BRANSCOME:</p> <p>8 Q Are there any scientific publications</p> <p>9 that were available to you during your review in</p> <p>10 connection with your formation of opinions in the</p> <p>11 MDL that were not available to the authors of the</p> <p>12 Taher manuscript?</p> <p>13 MS. PARFITT: Objection. Form.</p> <p>14 THE WITNESS: So are you talking about</p> <p>15 the meta-analysis that -- are you talking about</p> <p>16 studies that went into meta-analysis or are you</p> <p>17 talking about the, you know, 200 or 300 references</p> <p>18 in my bibliography?</p> <p>19 BY MS. BRANSCOME:</p> <p>20 Q Fair enough.</p> <p>21 Are there any studies that you included</p> <p>22 in your meta-analysis that, at least to your</p> <p>23 knowledge, were available to you and were not</p> <p>24 available to the Taher authors?</p> <p>25 MS. PARFITT: Objection. Form.</p>
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<p>1 manuscript to reference 69 is to the Terry pooled</p> <p>2 analysis from 2013, correct?</p> <p>3 A Correct.</p> <p>4 Q And so you agree that at least the Taher</p> <p>5 authors considered the Berge, Penninkilampi, and</p> <p>6 Terry studies.</p> <p>7 MS. PARFITT: Objection. Form.</p> <p>8 THE WITNESS: Were aware of. I'm not</p> <p>9 sure what you mean by considered. They -- they</p> <p>10 referenced it. I don't know that they considered</p> <p>11 it in their -- I don't imagine that there's any</p> <p>12 place in their statistical analysis where they</p> <p>13 introduced data from any of those papers. They're</p> <p>14 just acknowledging that those other meta-analyses</p> <p>15 found the same thing that they found.</p> <p>16 BY MS. BRANSCOME:</p> <p>17 Q So perhaps we have a different</p> <p>18 understanding of the word "considered."</p> <p>19 A Okay.</p> <p>20 Q Would you agree that a fair reading of</p> <p>21 their Conclusion paragraph would indicate that the</p> <p>22 Taher authors were first aware --</p> <p>23 A Yes.</p> <p>24 Q -- of Terry, Berge and Penninkilampi?</p> <p>25 A Yes.</p>	<p>1 THE WITNESS: Oh, they would have been</p> <p>2 available because all of my -- the studies I used</p> <p>3 are in publicly available literature, and I'm sure</p> <p>4 they were available.</p> <p>5 BY MS. BRANSCOME:</p> <p>6 Q Okay. Do you have any criticisms of the</p> <p>7 Taher 2018 meta-analysis?</p> <p>8 A I haven't evaluated it closely enough</p> <p>9 to -- to formulate criticisms or praise or --</p> <p>10 Q Now, you testified earlier that there</p> <p>11 was a flurry of activity in December surrounding</p> <p>12 the information from Health Canada and the Taher</p> <p>13 manuscript.</p> <p>14 Is there a reason why you have not</p> <p>15 reviewed the Taher manuscript in detail and formed</p> <p>16 an opinion about whether you agree or disagree</p> <p>17 with its analysis?</p> <p>18 MS. PARFITT: Objection. Fully</p> <p>19 misstates his testimony. Form.</p> <p>20 THE WITNESS: I -- I thought that it</p> <p>21 would have absolutely no bearing on the results</p> <p>22 and the opinions that I expressed in my report,</p> <p>23 plus I didn't have time to do such a review. And</p> <p>24 so the combination of those two things made it a</p> <p>25 simple decision not to devote precious time and</p>

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<p>1 effort to a -- a futile activity.</p> <p>2 I'm not uninterested in what they did or</p> <p>3 what they found, but I can predict pretty quickly</p> <p>4 what they did and what they found, and I -- I know</p> <p>5 the studies that they reviewed, that they had</p> <p>6 access to. There's nothing that they would find</p> <p>7 that I wouldn't be able to predict.</p> <p>8 MS. BRANSCOME: Okay.</p> <p>9 Now may be a good time to take a break.</p> <p>10 MS. PARFITT: Sure. Okay. Very good.</p> <p>11 MS. BRANSCOME: Let's go off the record.</p> <p>12 MR. TISI: Are we switching examiners</p> <p>13 too?</p> <p>14 MS. BRANSCOME: I don't know. That's</p> <p>15 why --</p> <p>16 MS. PARFITT: Oh, fair enough. Fair</p> <p>17 enough.</p> <p>18 THE VIDEOGRAPHER: We're going off the</p> <p>19 record at 6:22 p.m.</p> <p>20 (Recess.)</p> <p>21 THE VIDEOGRAPHER: This begins disc</p> <p>22 number 5 in the deposition of Jack Siemiatycki.</p> <p>23 We are going back on the record at 6:40 p.m.</p> <p>24 BY MS. BRANSCOME:</p> <p>25 Q So, Dr. Siemiatycki, if you could open</p>	<p>1 criteria, but which are not criteria and shouldn't</p> <p>2 be called criteria.</p> <p>3 Q Understanding that you have specific</p> <p>4 views about the appropriateness and application of</p> <p>5 it, you are at least familiar with what is</p> <p>6 sometimes referred to as a Bradford Hill analysis</p> <p>7 or the Hill criteria, correct?</p> <p>8 A I don't -- again, the phrase "Bradford</p> <p>9 Hill analysis" doesn't mean anything. I don't</p> <p>10 think you would find that phrase in any</p> <p>11 epidemiology or statistics textbook.</p> <p>12 Q Are you saying as you sit here today,</p> <p>13 Dr. Siemiatycki, you've never heard of the Hill</p> <p>14 criteria?</p> <p>15 MS. PARFITT: Objection. Misstates his</p> <p>16 testimony.</p> <p>17 THE WITNESS: No, I've heard of it, and</p> <p>18 I'm saying that it's a misnomer. And so I'd</p> <p>19 prefer if the correct terminology is used when --</p> <p>20 if you're asking me questions about it.</p> <p>21 BY MS. BRANSCOME:</p> <p>22 Q The authors of the Taher manuscript use</p> <p>23 the term "Hill criteria" --</p> <p>24 A Yes.</p> <p>25 Q -- in their Table 2, correct?</p>
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<p>1 back up to the Taher manuscript again. I believe</p> <p>2 it's in your binder that's been marked as</p> <p>3 Exhibit 6, and specifically, if you could go to</p> <p>4 Figure 3 on page 39.</p> <p>5 Have you looked at Figure 3 from the</p> <p>6 Taher 2018 manuscript before now?</p> <p>7 A No, I haven't. I may have glanced at it</p> <p>8 going through it, but I haven't examined it.</p> <p>9 Q Did you look at anything in the Taher</p> <p>10 manuscript to support your opinion that there is</p> <p>11 at least evidence compatible with the dose-</p> <p>12 response relationship between perineal use of talc</p> <p>13 and ovarian cancer?</p> <p>14 A I didn't look for that in this paper.</p> <p>15 Q If you could look at page 25 of the</p> <p>16 Taher paper.</p> <p>17 Do you see here that the authors of the</p> <p>18 Taher manuscript describe the summary of evidence</p> <p>19 for each of the Hill criteria of causation? Do</p> <p>20 you see that?</p> <p>21 A I see that.</p> <p>22 Q And you are familiar with the Hill --</p> <p>23 the Hill criteria of causation, correct?</p> <p>24 A I'm familiar with what they call the</p> <p>25 Hill criteria and what some people call the Hill</p>	<p>1 A Yes, they do.</p> <p>2 Q And there is a discussion under the --</p> <p>3 what they refer to as a criterion for strength of</p> <p>4 association, correct?</p> <p>5 A Yes.</p> <p>6 Q And the Taher authors report that out of</p> <p>7 30 epidemi- -- epidil- -- epidemiological studies --</p> <p>8 it's late in the day -- six reported positive</p> <p>9 association of statistical significance with a</p> <p>10 risk value, relative risk or odds ratio of 1.5 or</p> <p>11 greater.</p> <p>12 Is that description of the</p> <p>13 epidemiological studies accurate?</p> <p>14 A I don't know. I haven't counted. I</p> <p>15 haven't done that kind of counting, which is</p> <p>16 irrelevant and wrong from a statistical and</p> <p>17 epidemiological point of view to do it. So I</p> <p>18 haven't done it, and I can't confirm that there</p> <p>19 are six that report odds ratios greater than 1.5.</p> <p>20 I could do that if you want me to. I can look</p> <p>21 through studies and see.</p> <p>22 But there's no -- there's no scientific</p> <p>23 purpose in doing that. It's a meaningless piece</p> <p>24 of information.</p> <p>25 Q Would you criticize the Taher authors</p>

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<p>1 for their discussion of the Hill criteria?</p> <p>2 A Yes.</p> <p>3 Q And you have explained your criticisms</p> <p>4 about the Hill criteria in both your trial</p> <p>5 testimony and in your prior deposition testimony,</p> <p>6 correct?</p> <p>7 A I can't remember the details, but I -- I</p> <p>8 guess if I was asked about it, I explained what I</p> <p>9 thought about it.</p> <p>10 My criticism -- I'm not sure what you</p> <p>11 mean by my criticisms of the term or of the</p> <p>12 concepts that the paper that Hill wrote in 1965,</p> <p>13 the ways -- the umpteen different ways that other</p> <p>14 people have interpreted it. What -- what are you</p> <p>15 referring to when you say I criticized? What did</p> <p>16 I criticize?</p> <p>17 Q Have your views with respect to the use</p> <p>18 and application of the so-called Hill criterion</p> <p>19 changed since you testified in the Echeverria</p> <p>20 trial?</p> <p>21 MS. PARFITT: Objection. Form.</p> <p>22 THE WITNESS: They -- they haven't</p> <p>23 changed in 40 years.</p> <p>24 BY MS. BRANSCOME:</p> <p>25 Q Okay. Thank you.</p>	<p>1 Q 48 in my binder, but I don't know if you</p> <p>2 have a copy in yours, which might be faster.</p> <p>3 A No, this -- I have the -- I have the</p> <p>4 current Berge paper. So...</p> <p>5 Q At page 9, I believe.</p> <p>6 Well, that's confusing to say page 9.</p> <p>7 A Okay, I see that.</p> <p>8 Q Okay. In reviewing the conclusion that</p> <p>9 the Berge authors reached, would -- did the Berge</p> <p>10 authors conclude that genital talc use was a</p> <p>11 probable cause of ovarian cancer?</p> <p>12 A They did not indicate that they</p> <p>13 concluded that.</p> <p>14 Q Okay. And same for the Penninkilampi</p> <p>15 study.</p> <p>16 MS. PARFITT: Had you finished? Had you</p> <p>17 finished your statement.</p> <p>18 THE WITNESS: Not quite.</p> <p>19 There's a difference between the</p> <p>20 findings of a study and the inferences that are</p> <p>21 drawn from those findings. So the findings of</p> <p>22 their meta-analyses and the findings of the</p> <p>23 Penninkilampi meta-analyses and findings of the</p> <p>24 Taher meta-analyses are the same as my findings.</p> <p>25 All four agree on the findings.</p>
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<p>1 Now, we have just discussed three</p> <p>2 meta-analyses: The Berge meta-analyses, the</p> <p>3 Penninkilampi meta-analyses, and the Taher</p> <p>4 meta-analyses. Correct?</p> <p>5 A Yes.</p> <p>6 Q Would you agree that none of the authors</p> <p>7 of those three meta-analyses concluded that talc</p> <p>8 was a probable cause of ovarian cancer?</p> <p>9 MS. PARFITT: Objection. Form.</p> <p>10 THE WITNESS: The purpose of those</p> <p>11 meta-analyses was to estimate the meta-estimate of</p> <p>12 relative risk. In terms of the conclusion about</p> <p>13 probable causation, I think they all commented on</p> <p>14 it in their discussions.</p> <p>15 And can you specify your question again,</p> <p>16 whether they concluded that it was a probable</p> <p>17 cause?</p> <p>18 BY MS. BRANSCOME:</p> <p>19 Q Correct.</p> <p>20 A I'd have to look at the way they -- what</p> <p>21 conclusions they drew, I'd have to look at that.</p> <p>22 Q Okay. If we could look at the Berge</p> <p>23 paper, which should be tab --</p> <p>24 A Let me see, I think I have the latest</p> <p>25 issue of the Berge paper.</p>	<p>1 Interpreting and making inferences is a</p> <p>2 whole other bailiwick, a whole other activity, and</p> <p>3 they don't -- didn't conclude in this section that</p> <p>4 it's a probable cause. From the same evidence, I</p> <p>5 do conclude that it's a probable cause.</p> <p>6 BY MS. BRANSCOME:</p> <p>7 Q Right. And the same is true for the</p> <p>8 Penninkilampi officer -- authors, correct?</p> <p>9 A Sorry, I have to go through it.</p> <p>10 (Peruses document.)</p> <p>11 I don't really agree with your</p> <p>12 statement. I don't think they conclude that it's</p> <p>13 probable or not probable. I don't see -- can you</p> <p>14 point me to a statement that would imply that it's</p> <p>15 not -- that they think it's not probable?</p> <p>16 Q Do the authors of the Penninkilampi</p> <p>17 paper use the phrase, quote, suggestive of a</p> <p>18 causal association, in the Conclusion section?</p> <p>19 A Yes, they do.</p> <p>20 Q Okay. Would you say that "suggestive of</p> <p>21 a causal association" is equivalent to probable</p> <p>22 causation?</p> <p>23 MS. PARFITT: Objection. Form.</p> <p>24 THE WITNESS: That's a semantic</p> <p>25 question, and how different people and different</p>

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<p>1 cultures -- and I think these people are</p> <p>2 Australians -- how Australians tend to use the</p> <p>3 word "suggestive." I -- I don't read this in a</p> <p>4 way as to suggest that they don't think it's</p> <p>5 probable.</p> <p>6 BY MS. BRANSCOME:</p> <p>7 Q So you don't know from reviewing the</p> <p>8 Conclusion section one way or the other whether</p> <p>9 the Penninkilampi authors view perineal use of</p> <p>10 talc as a probable cause of ovarian cancer.</p> <p>11 MS. PARFITT: Objection. Form,</p> <p>12 misstates his testimony.</p> <p>13 Just answer the question.</p> <p>14 THE WITNESS: Yes, that's right, I -- I</p> <p>15 don't.</p> <p>16 BY MS. BRANSCOME:</p> <p>17 Q Okay. And as we just looked at in the</p> <p>18 Taher manuscript, the Taher authors describe that</p> <p>19 the data indicates perineal exposure to talc</p> <p>20 powder is a possible cause of ovarian cancer in</p> <p>21 humans, correct?</p> <p>22 And if you need the reference, it's</p> <p>23 page 49.</p> <p>24 A That's correct.</p> <p>25 Possible does not preclude probable, by</p>	<p>1 "possible" here can cover a range of possibilities</p> <p>2 that includes probable.</p> <p>3 So if something is possible, that means</p> <p>4 it could happen, and in their view or in some of</p> <p>5 their -- those authors' view, the possibility or</p> <p>6 the probability of -- of such a thing happening</p> <p>7 might be greater than 50 percent, and they might</p> <p>8 still describe it as a possible cause of ovarian</p> <p>9 cancer.</p> <p>10 Q You would be --</p> <p>11 MR. KLATT: Object. Nonresponsive.</p> <p>12 Sorry.</p> <p>13 BY MS. BRANSCOME:</p> <p>14 Q You would be purely speculating to opine</p> <p>15 that the Taher authors, for example, when they</p> <p>16 used the term "possible" to describe the</p> <p>17 association, they actually meant probable,</p> <p>18 correct?</p> <p>19 MS. PARFITT: Objection. Form.</p> <p>20 THE WITNESS: I didn't say they -- they</p> <p>21 actually -- I meant -- I said that it could</p> <p>22 include probable.</p> <p>23 And so you are -- the sense of your</p> <p>24 question is to suppose or assume that their use of</p> <p>25 the word "possible" excludes the concept of</p>
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<p>1 the way. I'm not -- I'm not assume- -- are you</p> <p>2 assuming that they had in mind the IARC</p> <p>3 classification system and that these two</p> <p>4 categories are mutually exclusive?</p> <p>5 Q My question to you, Dr. Siemiatycki, is</p> <p>6 did any of the authors of the three other</p> <p>7 meta-analyses, Berge, Penninkilampi or Taher,</p> <p>8 conclude in their papers that perineal talc use is</p> <p>9 a probable cause of ovarian cancer?</p> <p>10 MS. PARFITT: Objection. Form. Asked</p> <p>11 and answered.</p> <p>12 THE WITNESS: They did not use that</p> <p>13 word. But I would not infer that they don't think</p> <p>14 it's a probable cause from the write-up of</p> <p>15 their -- from their write-up. It is possible that</p> <p>16 they consider the description of this as a --</p> <p>17 where is the word "possible"? Is that in the</p> <p>18 Conclusion?</p> <p>19 BY MS. BRANSCOME:</p> <p>20 Q It is.</p> <p>21 A Oh, yeah, possible cause.</p> <p>22 You know, they are -- I mean, I can't</p> <p>23 speak for them because I haven't spoken to any of</p> <p>24 them about this, but I don't think they're</p> <p>25 speaking to a legal audience. And the word</p>	<p>1 probable, that they did not think it's -- because</p> <p>2 they used the word "possible," they absolutely</p> <p>3 denied that it's probable. And I -- that's what</p> <p>4 I'm disagreeing with.</p> <p>5 BY MS. BRANSCOME:</p> <p>6 Q Where I'm coming from is not relevant to</p> <p>7 the question that I'm asking, Dr. Siemiatycki.</p> <p>8 The question that I'm asking you is, do any of the</p> <p>9 authors of the three meta-analyses that we just</p> <p>10 reviewed, Berge, Penninkilampi, and Taher,</p> <p>11 describe in their papers the association between</p> <p>12 perineal use of talc and ovarian cancer as a</p> <p>13 probable causal association?</p> <p>14 MS. PARFITT: Objection. Form.</p> <p>15 BY MS. BRANSCOME:</p> <p>16 Q Do any of them use that term?</p> <p>17 MS. PARFITT: Objection. Form.</p> <p>18 THE WITNESS: None of them use that</p> <p>19 term, but that doesn't preclude that they -- some</p> <p>20 of them believe it is probable.</p> <p>21 MR. KLATT: Object. Nonresponsive.</p> <p>22 BY MS. BRANSCOME:</p> <p>23 Q You have no basis for concluding or even</p> <p>24 suggesting that any of these authors have the</p> <p>25 opinion that it is a probable causal association</p>

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<p>1 other than speculating based off of what you're</p> <p>2 reading on the page, correct?</p> <p>3 MS. PARFITT: Objection. Form.</p> <p>4 THE WITNESS: Correct. Nor do I have</p> <p>5 any basis for assuming that they don't think it's</p> <p>6 probable on the basis of what I read.</p> <p>7 BY MS. BRANSCOME:</p> <p>8 Q When you write scientific manuscripts,</p> <p>9 Dr. Siemiatycki, are you careful about your word</p> <p>10 choice, particularly in your conclusion section?</p> <p>11 MS. PARFITT: Objection. Form.</p> <p>12 THE WITNESS: I try to be. I try to be.</p> <p>13 BY MS. BRANSCOME:</p> <p>14 Q Okay. If you could turn to tab 33 in</p> <p>15 your binder.</p> <p>16 Are you familiar with the document that</p> <p>17 is located behind tab 33 in your binder there?</p> <p>18 A I -- I think so. I -- mine had a</p> <p>19 different cover page when I printed it off, but</p> <p>20 that's fine. I'm -- I assume it's the same one</p> <p>21 I -- I had.</p> <p>22 MR. TISI: It's not. It's not.</p> <p>23 MS. PARFITT: What are you referring to?</p> <p>24 MR. TISI: The draft article is not --</p> <p>25 MS. PARFITT: Yeah, I know that.</p>	<p>1 bureau or division. I'm not quite sure.</p> <p>2 Q Okay. And the document that you're</p> <p>3 looking at there is contained within a binder that</p> <p>4 we have previously marked as Exhibit 4, correct?</p> <p>5 A Correct.</p> <p>6 Q All right. Is this an item -- is this</p> <p>7 an item.</p> <p>8 Is this Draft Screening Assessment a</p> <p>9 document that you considered in forming your</p> <p>10 opinions in this case?</p> <p>11 A No, it isn't.</p> <p>12 Q Why not?</p> <p>13 A Because I was only aware of it a month</p> <p>14 or -- a month and a half or two months after I</p> <p>15 completed my report, and two years after I formed</p> <p>16 the main part of my opinion.</p> <p>17 Q How did you obtain a copy of the Draft</p> <p>18 Screening Assessment by Health Canada?</p> <p>19 A I think that this was on the internet.</p> <p>20 I think I --</p> <p>21 THE WITNESS: Yeah, some other -- there</p> <p>22 should be a light button that we can press.</p> <p>23 Excuse me. Excuse me, just maybe off</p> <p>24 the record for a second.</p> <p>25 (A discussion was held off the record.)</p>
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<p>1 THE WITNESS: Is it the Draft Screening</p> <p>2 Assessment?</p> <p>3 MR. TISI: No, that's not the same.</p> <p>4 THE WITNESS: No?</p> <p>5 MR. TISI: It's not.</p> <p>6 MS. PARFITT: Do you have a copy of</p> <p>7 yours?</p> <p>8 THE WITNESS: Yeah.</p> <p>9 MS. BRANSCOME: Can we go off the record</p> <p>10 while we figure this out?</p> <p>11 MS. PARFITT: Sure, that would be fine.</p> <p>12 THE VIDEOGRAPHER: We're going off the</p> <p>13 record at 6:58 p.m.</p> <p>14 (Pause in the proceedings.)</p> <p>15 THE VIDEOGRAPHER: We're back on the</p> <p>16 record at 7:01 p.m.</p> <p>17 BY MS. BRANSCOME:</p> <p>18 Q Dr. Siemiatycki, you have a document in</p> <p>19 front of you that is labeled a "Draft Screening</p> <p>20 Assessment" dated December 2018; is that correct?</p> <p>21 A Yes, I do.</p> <p>22 Q And this is a screening assessment by</p> <p>23 the Environment and Climate Change Canada, Health</p> <p>24 Canada, correct?</p> <p>25 A It's a branch of Health Canada or a</p>	<p>1 THE VIDEOGRAPHER: We are going off the</p> <p>2 record at 7:03 p.m.</p> <p>3 (Pause in the proceedings.)</p> <p>4 THE VIDEOGRAPHER: We are back on the</p> <p>5 record at 7:03 p.m.</p> <p>6 BY MS. BRANSCOME:</p> <p>7 Q Dr. Siemiatycki, we paused because the</p> <p>8 lights turned off, but my question to you is, how</p> <p>9 did you obtain a copy of the Draft Screening</p> <p>10 Assessment by Health Canada?</p> <p>11 A Either it was sent to me by Ms. Parfitt</p> <p>12 or her staff, or I found it on the internet. And</p> <p>13 I can't quite remember now.</p> <p>14 Q Do you remember when you first obtained</p> <p>15 a copy of the Draft Screening Assessment?</p> <p>16 A My guess is just before I went on</p> <p>17 vacation for Christmas and New Years. So it would</p> <p>18 have been mid -- mid to -- mid-December, I guess,</p> <p>19 something like that.</p> <p>20 Q Are you familiar with the process by</p> <p>21 which draft screening assessments are generated by</p> <p>22 Health Canada?</p> <p>23 A No, not really. I was involved with</p> <p>24 this department of Health Canada 30 years ago, and</p> <p>25 I haven't been involved since. I don't know how</p>

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<p>1 they function really to produce these evaluations</p> <p>2 and reports.</p> <p>3 Q Did you have any involvement, even</p> <p>4 tangentially, in the development of the Draft</p> <p>5 Screening Assessment by Health Canada?</p> <p>6 A No.</p> <p>7 Q Were you ever asked to consult on any of</p> <p>8 the content that ultimately ended up in the Draft</p> <p>9 Screening Assessment?</p> <p>10 A No, I wasn't.</p> <p>11 Q Were you ever contacted about</p> <p>12 potentially being involved in a Draft Screening</p> <p>13 Assessment of talc for Health Canada?</p> <p>14 A No. Never.</p> <p>15 Q You are aware that this is in fact a</p> <p>16 draft assessment by Health Canada, correct?</p> <p>17 MS. PARFITT: Objection. Form.</p> <p>18 THE WITNESS: I see that's what it says</p> <p>19 on the cover page.</p> <p>20 BY MS. BRANSCOME:</p> <p>21 Q Are you aware of what further steps in</p> <p>22 the process must be taken before the draft</p> <p>23 assessment is potentially accepted or modified?</p> <p>24 MS. PARFITT: Objection. Form.</p> <p>25 THE WITNESS: I'm not familiar with the</p>	<p>1 A Yes.</p> <p>2 Q Do you believe --</p> <p>3 A If I make such a submission, yes.</p> <p>4 Q Why -- well, first of all, do you think</p> <p>5 it's important to disclose your involvement in the</p> <p>6 litigation if you were to submit something for</p> <p>7 public comment?</p> <p>8 A Yes, I think it is.</p> <p>9 Q And why is that?</p> <p>10 A Because there's a potential conflict of</p> <p>11 interest, and they should know about it.</p> <p>12 Q Would you also notify IARC of your role</p> <p>13 in litigation involving talcum powder products if</p> <p>14 you submitted something to them to suggest that a</p> <p>15 formal evaluation of talc be conducted?</p> <p>16 A Yes, I would.</p> <p>17 Q Is that for the same reason?</p> <p>18 A Yes, it is.</p> <p>19 Q Is the Draft Screening Assessment the</p> <p>20 type of material that you think it is reliable to</p> <p>21 base an expert opinion on?</p> <p>22 MS. PARFITT: Objection. Form.</p> <p>23 THE WITNESS: An expert opinion about</p> <p>24 what?</p> <p>25 BY MS. BRANSCOME:</p>
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<p>1 details, no.</p> <p>2 BY MS. BRANSCOME:</p> <p>3 Q What are you familiar with, if not the</p> <p>4 details?</p> <p>5 A I remember seeing that there's a public</p> <p>6 consultation opportunity, and -- so I guess there</p> <p>7 will be a period of time during which they will</p> <p>8 accept public recommendations and comments. And I</p> <p>9 don't know if it's the same committee that will</p> <p>10 then review all of that or a committee that's</p> <p>11 higher up on the administrative pecking order. I</p> <p>12 don't -- I don't know what happens internally.</p> <p>13 Q Do you intend to submit anything for</p> <p>14 the -- during the public comment period?</p> <p>15 A I -- yeah, I hope to do so. I hope to</p> <p>16 do so.</p> <p>17 Q What specifically do you intend to</p> <p>18 submit?</p> <p>19 A I'm not sure yet. I -- I would probably</p> <p>20 submit an opinion supporting the notion that</p> <p>21 perineal use of talc is more likely than not</p> <p>22 related to ovarian cancer.</p> <p>23 Q In your submission, do you intend to</p> <p>24 disclose your role in litigation involving talcum</p> <p>25 powder products?</p>	<p>1 Q About the potential relationship between</p> <p>2 talc and ovarian cancer.</p> <p>3 MS. PARFITT: Objection. Form.</p> <p>4 THE WITNESS: Are you asking if it would</p> <p>5 influence my opinion on the issue or --</p> <p>6 BY MS. BRANSCOME:</p> <p>7 Q So under- -- understanding that the</p> <p>8 Draft Screening Assessment came out after you had</p> <p>9 formed your opinion, I'm asking you that if that</p> <p>10 had not been the case, if it had come out while</p> <p>11 you were still forming your expert opinion, is</p> <p>12 this something that you would rely on?</p> <p>13 A I would take cognizance of it, and I'm</p> <p>14 not sure whether it would persuade me in one</p> <p>15 direction or another on the strength of the</p> <p>16 evidence, but it -- it would certainly give me --</p> <p>17 increase my comfort level to draw inferences to</p> <p>18 see what inferences other people draw. I won't</p> <p>19 necessarily follow their opinions, but I find it</p> <p>20 useful to know what inferences they would draw</p> <p>21 from it.</p> <p>22 Q Is a Draft Screening Assessment the type</p> <p>23 of report or publication that you see cited in</p> <p>24 published scientific literature?</p> <p>25 MS. PARFITT: Objection. Form.</p>

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<p>1 THE WITNESS: Not -- not -- in 2 scientific literature, not so much, no. 3 BY MS. BRANSCOME: 4 Q The draft assessment -- first of all, 5 are you familiar with the proposal with respect to 6 talc that's contained in the draft assessment? 7 A Which proposal are you referring to? 8 Q I could refer you specifically to 9 page -- 10 MR. TISI: I spilled coffee on it too. 11 Sorry. You get what you get. 12 BY MS. BRANSCOME: 13 Q -- on page 29. 14 A The Conclusion section? 15 Q Yes. Have you reviewed this before? 16 A I -- I might have looked at it quickly. 17 But let me -- let me review it -- let me read it 18 now. (Peruses document.) 19 You know, it refers to the fit of the -- 20 their findings and conclusions with various 21 articles of law in the Canadian Environmental 22 Protection Act. I would have to know what those 23 articles of law are that this conforms to, that 24 these sentences purportedly conform to. I -- I 25 have no reason to doubt what they say, but I -- I</p>	<p>1 describing the conclusion as a proposal? Or -- 2 yeah. 3 BY MS. BRANSCOME: 4 Q Focusing specifically on the second 5 paragraph where it says: "It is proposed to 6 conclude that talc meets the criteria under 7 paragraph 64(c) of CEPA as it is entering or may 8 enter the environment in a quantity or 9 concentration or under conditions that constitute 10 or may constitute a danger in Canada to human life 11 or health." 12 MS. PARFITT: Objection. Form. 13 THE WITNESS: It's not a way of 14 describing scientific evidence that I'm intimately 15 familiar with. So I would need to review this 16 document in more detail and be aware of the 17 paragraph 64(c) of the CEPA. 18 BY MS. BRANSCOME: 19 Q And that is not something you -- 20 A So I'm not -- 21 Q -- have done as of today? 22 A It's not something I base -- today I 23 couldn't say I agree with this or I don't agree 24 with this. 25 Q Okay. And so this is not -- the Draft</p>
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<p>1 can't confirm. 2 Q So as you sit here today, are you 3 capable or prepared to offer an opinion as to how 4 the conclusions in the Draft Screening Assessment 5 relate to other pieces of literature that we've 6 discussed today? 7 MS. PARFITT: Objection. Form. 8 THE WITNESS: How they relate to -- or 9 whether they're concordant with other pieces? 10 It's difficult for me to say without studying this 11 document more and seeing what the conformity is 12 with the Canadian pieces of legislation that they 13 refer to. So I -- I can't -- I can't give you 14 much more than that. 15 BY MS. BRANSCOME: 16 Q So as you sit here today, could you -- 17 do you have an opinion as to how the proposal in 18 the Draft Screening Assessment with respect to 19 talc relates to the current IARC classification of 20 talc? 21 MS. PARFITT: Objection. Form. 22 THE WITNESS: By proposal, you mean the 23 conclusion? 24 MS. PARFITT: The entire document. 25 THE WITNESS: You're -- you're</p>	<p>1 Screening Assessment by Health Canada is not 2 something that you are relying upon in any way in 3 offering your expert opinions in this case; is 4 that correct? 5 MS. PARFITT: Objection. Form, 6 misstates his testimony. 7 THE WITNESS: No. As I said, I didn't 8 rely on this to form my opinion. 9 BY MS. BRANSCOME: 10 Q Okay. 11 MS. BRANSCOME: Could we go off the 12 record just briefly? 13 MS. PARFITT: Of course. 14 THE VIDEOGRAPHER: We're going off the 15 record at 7:15 p.m. 16 (Pause in the proceedings.) 17 THE VIDEOGRAPHER: We're back on the 18 record at 7:16 p.m. 19 BY MS. BRANSCOME: 20 Q Dr. Siemiatycki, can you describe -- can 21 you identify for me specifically the pieces of 22 evidence that you would cite to in support of your 23 opinion that there is evidence consistent with a 24 dose-response relationship that was not considered 25 by the IARC 2006 working group?</p>

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<p>1 A Can --</p> <p>2 Q And I'm just looking for an</p> <p>3 identification of the papers.</p> <p>4 A Let me just dig out -- I keep hiding</p> <p>5 things from myself.</p> <p>6 MS. PARFITT: Okay.</p> <p>7 THE WITNESS: Oh, there.</p> <p>8 The primary pieces of evidence -- the</p> <p>9 primary piece of evidence is the analysis carried</p> <p>10 out in the Terry, et al., paper where they</p> <p>11 combined ten different studies from eight</p> <p>12 different research teams. They had by far the</p> <p>13 largest sample size of any conglomeration of</p> <p>14 studies ever conducted, enough to properly</p> <p>15 evaluate dose-response. And that's one of them.</p> <p>16 The second one is the Schildkraut study,</p> <p>17 which is much smaller than the Terry study in</p> <p>18 terms of numbers.</p> <p>19 And the third -- a third one, which was</p> <p>20 not part of the evidence that influenced my</p> <p>21 evaluation, is the latest version of the Berge</p> <p>22 paper which has some dose-response results in a</p> <p>23 table whose origin I don't completely understand,</p> <p>24 but ostensibly it gives dose-response trends that</p> <p>25 are significant and meaningful for duration and</p>	<p>1 use your own copy if that's more convenient.</p> <p>2 A Yep. There we go. Okay.</p> <p>3 Q Did the authors of the Terry 2013 paper,</p> <p>4 did they conclude in their manuscript that they</p> <p>5 had observed a statistically significant dose-</p> <p>6 response relationship between the perineal use of</p> <p>7 talc and ovarian cancer?</p> <p>8 A They reported two different ways of</p> <p>9 calculating the statistical significance of a</p> <p>10 trend. One of them was significant, and the other</p> <p>11 was formal, in terms of the conventional 0.05</p> <p>12 statistical significance level, was not</p> <p>13 significant at that level.</p> <p>14 Q And in fact in the abstract, the authors</p> <p>15 of the Terry paper state that: "Among genital</p> <p>16 powder users, we observed no significant trend,</p> <p>17 p equals 0.17, in risk with increasing number of</p> <p>18 lifetime applications," in parentheses, "assessed</p> <p>19 in quartiles."</p> <p>20 Did I read that correctly?</p> <p>21 A That's correct.</p> <p>22 Q Okay. Now, in your 2016 report --</p> <p>23 A Yeah.</p> <p>24 Q -- you had the statement that: "The</p> <p>25 appropriate statistical test for trend is one that</p>
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<p>1 frequency of exposure. But I would put less</p> <p>2 weight on that until I fully understand what --</p> <p>3 how they derived those estimates.</p> <p>4 BY MS. BRANSCOME:</p> <p>5 Q Okay. So the pieces of evidence that</p> <p>6 you would cite to in support of the idea that</p> <p>7 there has been a development that is supportive of</p> <p>8 a dose-response relationship between perineal talc</p> <p>9 and ovarian cancer since the IARC classification</p> <p>10 of talc as a 2B would be the Terry, the</p> <p>11 Schildkraut, and potentially the Berge analysis;</p> <p>12 is that correct?</p> <p>13 MS. PARFITT: Objection --</p> <p>14 THE WITNESS: Yes.</p> <p>15 MS. PARFITT: -- to the reference of</p> <p>16 "potentially the Berge." Form.</p> <p>17 BY MS. BRANSCOME:</p> <p>18 Q You did not rely in any way on the</p> <p>19 analysis in the Berge 2018 paper for your</p> <p>20 conclusion that there is evidence compatible with</p> <p>21 a dose-response relationship between perineal talc</p> <p>22 use and ovarian cancer, correct?</p> <p>23 A That's correct.</p> <p>24 Q Okay. So looking first at the Terry</p> <p>25 2013 paper. This is tab 14 or you're welcome to</p>	<p>1 excludes the baseline unexposed category."</p> <p>2 Do you remember having that sentence in</p> <p>3 your 2016 report?</p> <p>4 A I remember the -- the idea being there,</p> <p>5 yes.</p> <p>6 Q Okay. And you would agree that if you</p> <p>7 apply that statistical test for trend, meaning you</p> <p>8 exclude the baseline unexposed category, the Terry</p> <p>9 2013 paper does not demonstrate a dose-response</p> <p>10 relationship, correct?</p> <p>11 MS. PARFITT: Objection.</p> <p>12 THE WITNESS: No.</p> <p>13 MS. PARFITT: Misstates testimony.</p> <p>14 THE WITNESS: So I would not conclude --</p> <p>15 I would say that it demonstrates dose-response,</p> <p>16 but not at a statistical -- at a 0.05 statistical</p> <p>17 significance level.</p> <p>18 And I would also -- I can't remember the</p> <p>19 wording and the context in the 2016 report that</p> <p>20 you're referring to, but I would imagine that I</p> <p>21 preceded that statement with some mention of the</p> <p>22 fact that it depends if you are using the overall</p> <p>23 risk among all exposed people compared to</p> <p>24 unexposed people as a complementary piece of</p> <p>25 information.</p>

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<p>1 And it's only in the context when you 2 are using the -- all the exposed compared to all 3 the unexposed, and at the same time carrying out 4 an analysis of the different levels of exposure, 5 that including the unexposed among the -- in that 6 trend analysis becomes overlapping information 7 with the overall -- the significance of the 8 overall estimate. 9 BY MS. BRANSCOME: 10 Q Okay. 11 A This -- I'm not quite finished. Sorry. 12 So -- and because I don't want you to 13 think that I believe or believed that on its own 14 there is no evidence of dose-response. There is 15 evidence of dose-response in the Terry analysis. 16 The choice of which p-value to report on the trend 17 analysis depends completely on how one combines 18 that information with the ever exposed/never 19 exposed information and the p-value for that. 20 That when we want completely independent and 21 separate strands of evidence to corroborate each 22 other, then it's appropriate to exclude the 23 unexposed from the p-value computation. 24 When you are using -- when you are not 25 using the binary exposed/unexposed as part of the</p>	<p>1 are you positing? 2 BY MS. BRANSCOME: 3 Q Of those ten studies, which, if any of 4 them, postdate 2006? Do you know? 5 A Most of them do. I would say -- I think 6 the only one -- ones that were published before 7 2006 were a study by Chang and one or two of the 8 components of Cramer's studies. I think the rest 9 were all published post-2006. 10 Q Okay. Did you independently do an 11 analysis of the potential dose-response 12 relationship of perineal talc use and ovarian 13 cancer? 14 MS. PARFITT: Objection. Form. 15 THE WITNESS: By "independently," you 16 mean trying to replicate the Terry analysis? No. 17 I don't see why I would be motivated to do 18 something that someone else has already done. 19 BY MS. BRANSCOME: 20 Q Okay. So you are relying on the data as 21 reported by Terry 2013 that you consider to be 22 evidence in support of a dose-response 23 relationship, correct? 24 A That's correct. 25 Q Okay. But the authors themselves do not</p>
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<p>1 package of information to demonstrate causation, 2 then the correct p-value is the one that includes 3 the unexposed. So it depends how you use these 4 things. 5 If I didn't qualify that statement that 6 you read before, then I was in error. 7 Q If you did not have the Terry 2013 8 study -- 9 A Yes. 10 Q -- set that aside for a moment, you did 11 not have that data, would it still be your opinion 12 that the perineal use of talc probably causes 13 ovarian cancer? 14 A So -- 15 MS. PARFITT: Objection. Form. 16 THE WITNESS: So just to be clear what 17 the hypothetical supposition is, so the Terry 18 paper doesn't exist, but the studies underlying 19 the Terry paper still do exist, correct? Or they 20 don't exist either? 21 So there are ten studies underlying the 22 Terry reanalysis. Is your hypothetical question 23 about the possibility that none of those studies 24 existed or that they existed, but nobody actually 25 put them together to combine an analysis? What</p>	<p>1 conclude that there has been a statistically 2 significant dose-response relationship established 3 for the perineal use of talc and ovarian cancer, 4 correct? 5 MS. PARFITT: Objection. Form, 6 misstates the evidence. 7 THE WITNESS: I -- I didn't review what 8 they concluded in the Discussion section. If you 9 want, I could review that. And I -- I don't 10 remember what -- what kind of narrative inferences 11 they made about it. 12 BY MS. BRANSCOME: 13 Q Okay. 14 A You're asking me to confirm that they 15 didn't conclude, so I would want -- their data in 16 my mind indicates dose-response. How they 17 interpret it -- as I said before, they're two 18 separate things, the production of findings from 19 research and the interpretation of those findings. 20 I am as capable of interpreting -- they 21 aren't as capable of interpreting my findings from 22 my studies as I am or they are as capable -- they 23 have the right to. I have the right to interpret 24 their findings. It's a different activity 25 producing findings and then interpreting them. So</p>

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<p>1 how they interpreted their findings, I don't quite 2 remember exactly what they said about it. 3 Q Okay. 4 MS. BRANSCOME: I am going to pass to 5 counsel for Imerys at this time. 6 MR. KLATT: Can we go off the record for 7 just a couple of minutes? Let me get organized. 8 THE VIDEOGRAPHER: We are going off the 9 record at 7:31 p.m. 10 (Pause in the proceedings.) 11 THE VIDEOGRAPHER: We are going back on 12 the record at 7:32 p.m. 13 DIRECT EXAMINATION 14 BY MR. KLATT: 15 Q Good afternoon -- good evening, 16 Dr. Siemiatycki. 17 A Good evening. How are you? 18 Q I'm Mike Klatt. I represent Imerys Talc 19 America in this case. 20 I don't know if you recall or not, but 21 you and I had met about two years ago when you 22 were giving a deposition in the Oules and Swan 23 cases. Do you recall that? 24 A I do recall that. 25 Q Okay.</p>	<p>1 people at IARC and the public generally to know 2 that you had been a retained and paid expert by 3 plaintiffs' counsel in the talc ovarian cancer 4 litigation; is that correct? 5 A Sir, can you -- I think I already said 6 that, but could you repeat? Maybe I'm 7 misunderstanding. 8 Q Yes. I'm just saying such a conflict of 9 interest disclosure on your part, it would be 10 important to disclose not merely that you had been 11 a consultant or merely that you had been involved 12 in litigation involving ovarian cancer, but it 13 would be important to specifically disclose that 14 you had been a retained and paid expert by 15 plaintiffs' counsel in the talc/ovarian cancer 16 litigation. Correct? 17 MS. PARFITT: Objection. Form, asked 18 and answered. 19 THE WITNESS: I -- I'm not sure I 20 understand the distinction between this last 21 affirmation and the one before. I -- yes, it -- 22 BY MR. KLATT: 23 Q Well, we've had -- we've had other 24 conflict of interest disclosures, and I put that 25 in quotes, where people said that they had been a</p>
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<p>1 A Very fondly. 2 Q Thank you. 3 I just have a few questions for you, and 4 I want to go back and just make sure the record is 5 clear on something. 6 Your testimony is you've had no contact 7 or communications whatsoever with anyone with 8 Health Canada regarding talc; is that correct? 9 A That's correct. 10 Q And you've had no contact or 11 communications whatsoever with Dr. Krewski or 12 anyone else who's an author of the Taher 13 meta-analysis regarding talc? 14 A That's correct. 15 Q That's correct. Okay. 16 A minute ago I believe you told 17 Ms. Branscome that if you continued to interact 18 with IARC or have contact with Health Canada 19 regarding the issue of talc and ovarian cancer, 20 it's incumbent upon you to have a conflict of 21 interest disclosure, correct? 22 A Yes. I said that. 23 Q And you would agree with me it would be 24 important in evaluating any potential bias you 25 have for the people at Health Canada and the</p>	<p>1 consultant, period. That wouldn't be sufficient, 2 would it? 3 A I would -- 4 MS. PARFITT: Objection. Form. 5 THE WITNESS: I would not do that. 6 BY MR. KLATT: 7 Q And we've had people say, I've been 8 involved as an expert in ovarian cancer 9 litigation. That wouldn't be sufficient either, 10 correct? 11 MS. PARFITT: Objection. Form. 12 THE WITNESS: I would not do that. 13 BY MR. KLATT: 14 Q What you would do is you would say, I 15 have been a retained and paid expert by 16 plaintiffs' counsel in the talc/ovarian cancer 17 lawsuits, or something essentially equivalent to 18 that. 19 A I -- I would say something essentially 20 equivalent. It's quite possible that if there was 21 a submission to a journal, for example, or a 22 manuscript, the journal may have a formulaic way 23 of expressing that. So... 24 Q But wouldn't it be important to the 25 readers to know which side of the litigation you</p>

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<p style="text-align: right;">Page 278</p> <p>1 had been on in evaluating your bias?</p> <p>2 MS. PARFITT: Objection. Form, asked</p> <p>3 and answered.</p> <p>4 THE WITNESS: I -- I would -- I would</p> <p>5 disclose the nature of my involvement.</p> <p>6 BY MR. KLATT:</p> <p>7 Q Including which side?</p> <p>8 A Including which side I was consulting</p> <p>9 for.</p> <p>10 Q Okay.</p> <p>11 MR. KLATT: Can we mark this as the next</p> <p>12 exhibit?</p> <p>13 MS. PARFITT: 14.</p> <p>14 (Exhibit No. 14 was marked for</p> <p>15 identification.)</p> <p>16 BY MR. KLATT:</p> <p>17 Q Dr. Siemiatycki, you said earlier that</p> <p>18 you worked with Dr. Koushik; is that correct?</p> <p>19 A Yes.</p> <p>20 Q And what is your professional</p> <p>21 relationship with Dr. Koushik?</p> <p>22 A We are members of the same academic</p> <p>23 department. We are down the hall from each other.</p> <p>24 Our offices are nearby each other. We have worked</p> <p>25 together on various projects.</p>	<p style="text-align: right;">Page 280</p> <p>1 PROVAQ study, correct?</p> <p>2 A Correct.</p> <p>3 Q And that's the study she is working on</p> <p>4 with you, correct?</p> <p>5 A More I'm working on with her, but she's</p> <p>6 the lead on that.</p> <p>7 Q And with the help of others in your</p> <p>8 group as well --</p> <p>9 A With the help of others, yes.</p> <p>10 Q -- correct?</p> <p>11 And what I've handed you --</p> <p>12 MR. KLATT: And what was the exhibit</p> <p>13 number?</p> <p>14 MR. TISI: 14.</p> <p>15 BY MR. KLATT:</p> <p>16 Q Exhibit 14 is Dr. Koushik's web pages</p> <p>17 from the Environ Epi website. You're familiar</p> <p>18 with that website, correct?</p> <p>19 A Yes, I am.</p> <p>20 Q And you'll turn to the back page of the</p> <p>21 exhibit, the final page, and you will see it's</p> <p>22 copyrighted 2019, correct?</p> <p>23 A Correct.</p> <p>24 Q And let's just see what Dr. Koushik says</p> <p>25 about her research on the first page. She says:</p>
<p style="text-align: right;">Page 279</p> <p>1 Q For how long?</p> <p>2 A Ten -- 10 or 12 years now.</p> <p>3 Q And she's very well educated, correct?</p> <p>4 MS. PARFITT: Objection.</p> <p>5 THE WITNESS: I'm not sure what you mean</p> <p>6 by that. She has a --</p> <p>7 BY MR. KLATT:</p> <p>8 Q Well, she has a Bachelor --</p> <p>9 A She has a --</p> <p>10 Q -- of Science in pharmacology from the</p> <p>11 University of Alberta.</p> <p>12 A Correct.</p> <p>13 Q She has a Master's in community health</p> <p>14 and epidemiological from Queen's University in</p> <p>15 Kingston, Ontario?</p> <p>16 A Uh-huh.</p> <p>17 Q She has a Ph.D. in epidemiology from --</p> <p>18 in epidemiology and biostatistics from McGill</p> <p>19 University here in Montreal, correct?</p> <p>20 A Correct.</p> <p>21 Q And she's had a postdoctoral fellowship</p> <p>22 at Harvard in the U.S., correct?</p> <p>23 A Correct.</p> <p>24 Q And she is the principal investigator of</p> <p>25 the Prevention of Ovarian Cancer in Quebec, the</p>	<p style="text-align: right;">Page 281</p> <p>1 "My research program focuses on the epidemiology</p> <p>2 of ovarian and lung cancers." Correct?</p> <p>3 A Mm-hmm, yes.</p> <p>4 Q "Ovarian cancer is by far the most</p> <p>5 deadly of all gynecologic cancer. Most patients</p> <p>6 are diagnosed at advanced stages, leading to the</p> <p>7 poor prognosis, and we are currently limited in</p> <p>8 our ability to detect disease early." Correct?</p> <p>9 A Correct.</p> <p>10 Q She says: "There is overwhelming</p> <p>11 evidence that healthy lifestyle choices can reduce</p> <p>12 the risk of several cancers. However, we do not</p> <p>13 yet know of any effective ways to prevent the</p> <p>14 onset of ovarian cancer."</p> <p>15 Would you agree with that?</p> <p>16 MS. PARFITT: Objection. Form.</p> <p>17 THE WITNESS: I'm sorry, I'm trying to</p> <p>18 think of what this sentence really means. It's</p> <p>19 kind of a -- it's kind of a stock sentence that is</p> <p>20 used in -- by epidemiologists when they're looking</p> <p>21 for funding and trying to convince funders that</p> <p>22 we don't know a lot, and therefore they need to</p> <p>23 give us money. So I can imagine part of this is</p> <p>24 cut-and-pasted from that sort of document.</p> <p>25 BY MR. KLATT:</p>

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<p style="text-align: right;">Page 282</p> <p>1 Q Well, what it means is --</p> <p>2 MS. PARFITT: Wait, wait. Please let</p> <p>3 him finish.</p> <p>4 BY MR. KLATT:</p> <p>5 Q Go ahead.</p> <p>6 MS. PARFITT: Thanks, Mike.</p> <p>7 THE WITNESS: There are some risk</p> <p>8 factors that are well established for -- for</p> <p>9 ovarian cancer, which Anita is very well aware of,</p> <p>10 genetic and certain reproductive and hormonal</p> <p>11 factors.</p> <p>12 The evidence on talc is accumulating,</p> <p>13 and in my view is sufficient. Anita has not</p> <p>14 reviewed that evidence. And --</p> <p>15 BY MR. KLATT:</p> <p>16 Q Have you talked to Dr. Koushik at all</p> <p>17 about your involvement in the talc ovarian cancer</p> <p>18 litigation?</p> <p>19 A She's aware that I'm involved in this.</p> <p>20 Q Well, let's go on to see what she says</p> <p>21 here.</p> <p>22 After saying: "However, we do not yet</p> <p>23 know of any effective ways to prevent the onset of</p> <p>24 ovarian cancer," she says, "the evidence on some</p> <p>25 lifestyle factors, such as alcohol intake,</p>	<p style="text-align: right;">Page 284</p> <p>1 intake, and recreational physical activity."</p> <p>2 Correct?</p> <p>3 A Correct.</p> <p>4 Q She doesn't say a word about talc there,</p> <p>5 does she?</p> <p>6 MS. PARFITT: Objection. Form.</p> <p>7 THE WITNESS: She doesn't there because</p> <p>8 she hasn't started those analyses yet. She has</p> <p>9 started analyses -- or her -- with students on</p> <p>10 those other factors.</p> <p>11 BY MR. KLATT:</p> <p>12 Q And then flipping over to the next page,</p> <p>13 Dr. Koushik says: "Healthy lifestyle choices may</p> <p>14 also positively impact the health of ovarian</p> <p>15 cancer survivors. Indeed, until we know how to</p> <p>16 prevent ovarian cancers from occurring in the</p> <p>17 first place, cancer control through tertiary</p> <p>18 prevention aimed at improving prognosis and</p> <p>19 quality of life among those diagnosed is</p> <p>20 critical." Correct?</p> <p>21 A Correct.</p> <p>22 Q And again, no mention at all of talc,</p> <p>23 correct?</p> <p>24 MS. PARFITT: Objection. Form.</p> <p>25 THE WITNESS: Correct.</p>
<p style="text-align: right;">Page 283</p> <p>1 physical activity, and smoking, is suggestive but</p> <p>2 currently remains unclear." Correct?</p> <p>3 A Correct.</p> <p>4 Q She doesn't say one word about talc,</p> <p>5 does she?</p> <p>6 A No.</p> <p>7 MS. PARFITT: Objection. Form.</p> <p>8 THE WITNESS: Not here, no.</p> <p>9 BY MR. KLATT:</p> <p>10 Q And then she goes on to say: "More</p> <p>11 research is greatly needed, especially in light of</p> <p>12 recent discoveries that demonstrate that ovarian</p> <p>13 cancer is a heterogeneous disease." She says: "I</p> <p>14 am the principal investigator of the Prevention of</p> <p>15 Ovarian Cancer in Quebec, PROVAQ study, a</p> <p>16 population-based case-control study conducted in</p> <p>17 2011, 2016."</p> <p>18 And one of the things she's evaluating</p> <p>19 in that study is talc, correct?</p> <p>20 A Correct.</p> <p>21 Q "This study provides" -- and I'm reading</p> <p>22 on -- "This study provides a rich data source for</p> <p>23 the study of multiple hypotheses on lifestyle</p> <p>24 factors and ovarian cancer. Current projects</p> <p>25 focus on associations with shift work, caffeine</p>	<p style="text-align: right;">Page 285</p> <p>1 MR. KLATT: Let's mark that.</p> <p>2 MS. PARFITT: This is now 15.</p> <p>3 MR. KLATT: Have we marked that?</p> <p>4 MS. PARFITT: I just now did. I was</p> <p>5 looking for the stickers. I'm going to get one --</p> <p>6 here they are.</p> <p>7 THE WITNESS: I have a different cover.</p> <p>8 MS. PARFITT: It's a different one.</p> <p>9 That's yours.</p> <p>10 THE WITNESS: Oh.</p> <p>11 MS. PARFITT: This is different, this is</p> <p>12 a new item. Let me just put an exhibit on this</p> <p>13 one.</p> <p>14 (Exhibit No. 15 was marked for</p> <p>15 identification.)</p> <p>16 MS. PARFITT: Thank you.</p> <p>17 Okay. You're done with this. And he's</p> <p>18 just showing you this one.</p> <p>19 Do we have an extra copy, Mike, or is</p> <p>20 this it?</p> <p>21 MR. KLATT: I've got an extra copy if</p> <p>22 you need it.</p> <p>23 MS. PARFITT: Okay, that would be great.</p> <p>24 I will give him that one. Thank you very much.</p> <p>25 BY MR. KLATT:</p>

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<p style="text-align: right;">Page 286</p> <p>1 Q So, Dr. Siemiatycki, I'm now showing you 2 what we marked as exhibit -- what? 3 MS. PARFITT: 15. 4 MR. KLATT: 15? 5 MS. PARFITT: Yes. 6 BY MR. KLATT: 7 Q And it's from the Environ Epi website, 8 your website, and it's the web pages discussing 9 group research topics, correct? 10 A I -- I have to tell you I don't look at 11 this website, and I haven't actually constituted 12 it. It's my secretary or my assistant who does 13 this. So I'm looking at it afresh to see what's 14 there. Yeah. 15 Q Okay. Let's -- let's turn to the very 16 back page, and again the copyright is 2019. 17 That's this year, correct? 18 A Yeah. Yes. 19 Q And then if you will flip over to -- 20 let's see. Well, let's start -- let's see. 21 Go first page, second page, third 22 page -- the fourth page, there's a discussion 23 there of the PROVAQ study of Dr. Koushik that we 24 just talked about, correct? 25 A Yes.</p>	<p style="text-align: right;">Page 288</p> <p>1 reproductive factors is limited. There is 2 suggestive evidence that modifiable factors in the 3 vitamin D pathway, (sun exposure, diet), and 4 inflammation pathway (antiinflammatory medication 5 use, talc use for feminine hygiene) may play a 6 role in ovarian cancer risk, though this research 7 has been limited by small sample sizes, crude 8 exposure measurement and lack of control for 9 important confounders." Correct? 10 A That's what it says. 11 Q Did I read that correctly? 12 A Yes, you did. 13 Q So on this public website, your 14 Environmental Epi website, Dr. Jack Siemiatycki 15 doesn't say talc use causes ovarian cancer, 16 correct? 17 MS. PARFITT: Objection. Form. 18 THE WITNESS: I don't say anything on 19 that website. 20 BY MR. KLATT: 21 Q Well, you -- your group doesn't say talc 22 causes ovarian cancer, does it? 23 MR. TISI: Objection. Form. 24 THE WITNESS: In my opinion, this was 25 created somewhere around 2009, 2010, 2012, in that</p>
<p style="text-align: right;">Page 287</p> <p>1 Q And the topic says: "Prevention of 2 Ovarian Cancer in Quebec, the PROVAQ study, a 3 case-control study of modifiable and genetic 4 factors associated with the risk of ovarian 5 cancer." Correct? 6 A I see that. 7 Q And it says Anita Koushik, that's 8 Dr. Koushik, who we've just been talking about, 9 and it says Jack Siemiatycki. That's you, 10 correct? 11 A That's right. 12 Q And then it goes on to describe what the 13 PROVAQ study is, and it says -- and I'll skip the 14 first few sentences -- it says: "Primary 15 prevention thus offers the most promising approach 16 to reducing the morbidity and mortality associated 17 with this deadly disease. Established preventive 18 factors for ovarian cancer include high parity, 19 long duration of lactation, oral contraceptive 20 use, and tubal ligation." Correct? 21 A That's what it says. 22 Q Talc is not included in that list of 23 established preventive factors, is it? 24 A It's not listed there, no. 25 Q "However, the ability to modify these</p>	<p style="text-align: right;">Page 289</p> <p>1 ballpark. This feels to me like a cut and paste 2 from the grant application of 2009 or 2010 that 3 hasn't been changed. 4 There's not really a lot of motivation 5 for us to -- besides just sort of putting our 6 names and faces up there, our institution asks us 7 to put something on this institutional website 8 for a researcher. I haven't -- I've never looked 9 at this. 10 BY MR. KLATT: 11 Q You or your organization -- 12 MS. PARFITT: Wait. Mike -- Mike, 13 excuse me, I think we're done. 14 THE WITNESS: I've never contributed to 15 this or looked at it. 16 MS. PARFITT: No, no, Mike, 17 unfortunately, your time is up. 18 MR. KLATT: You've -- 19 MS. PARFITT: Mike, no more questions. 20 I have a few questions. I think we're -- 21 MR. KLATT: Are we -- are we done? 22 THE VIDEOGRAPHER: Yes. 23 MR. KLATT: All right. 24 MS. PARFITT: Thank you. I do have a 25 few.</p>

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<p style="text-align: right;">Page 290</p> <p>1 Dr. Siemiatycki, I'm going to stay right 2 over here for a moment, okay? And we can get 3 through this. Okay? 4 MR. KLATT: Here, I'll give this back to 5 you. 6 THE WITNESS: Hi. 7 MS. PARFITT: Tell me when you are 8 ready. 9 THE WITNESS: Who are you? 10 MS. PARFITT: I know. 11 MR. TISI: Are we back on? Are we back 12 on? 13 THE VIDEOGRAPHER: I didn't stop. 14 Sorry, I -- 15 MR. TISI: Oh, I thought we were off. 16 MS. PARFITT: Okay. We didn't -- we 17 didn't know that. 18 CROSS-EXAMINATION 19 BY MS. PARFITT: 20 Q Dr. Siemiatycki, good evening -- 21 Okay. Dr. Siemiatycki, good evening. I 22 know it's been a long day, and I have a few 23 questions, and I will be wrapping -- or jumping 24 around a bit, so hopefully try and keep pace with 25 me, and I'll try and speak slowly and -- so that</p>	<p style="text-align: right;">Page 292</p> <p>1 MS. BRANSCOME: Objection. 2 THE WITNESS: I think it was ordered -- 3 it was contracted in order to underpin the Health 4 Canada evaluation. That's my -- 5 BY MS. PARFITT: 6 Q All right. Now, it was not the only 7 study or research that was conducted by Health 8 Canada; is that correct? It was the meta-analysis 9 that was conducted by them. 10 MS. BRANSCOME: Objection. 11 THE WITNESS: Sorry, I -- what -- 12 BY MS. PARFITT: 13 Q The Taher study -- 14 A Study. 15 Q -- is a meta-analysis; is that correct? 16 A Yes. Yes. 17 Q All right. And the Taher meta-analysis 18 was one part of the information that formulated 19 part of the Health Canada draft assessment? 20 A That's my understanding, yes. 21 Q All right. Now, Daniel Krewski, you 22 indicated, was one of the authors of the Taher 23 paper. 24 A Yes. He's listed. 25 Q And I believe you testified that you</p>
<p style="text-align: right;">Page 291</p> <p>1 we can move through the remainder of your 2 deposition. 3 Dr. Siemiatycki, do you have an opinion 4 as to whether the elimination of talcum powder use 5 in the genital area is a lifestyle activity that 6 is modifiable? 7 If you need me to ask the question 8 again, I'm happy to. 9 A Yeah, I'm trying to think of how the 10 word "modifiable" is used. 11 Q Is it preventable? Is the use of talcum 12 powder products in the genital area a preventable 13 activity? 14 A Yes. 15 MS. BRANSCOME: Objection. 16 BY MS. PARFITT: 17 Q All right. Thank you. 18 All right. You were asked some 19 questions about the Taher article. You remember 20 that? 21 A Yes. 22 Q All right. And is it your understanding 23 that the Taher article is a meta-analysis that was 24 formed as part of the Health Canada 25 recommendation?</p>	<p style="text-align: right;">Page 293</p> <p>1 know Daniel Krewski. 2 A Yes, I do. 3 Q And I believe Mr. Klatt asked you 4 whether or not you had reached out or perhaps 5 Ms. Branscome asked you whether or not you have 6 had any communication with anyone, verbal, oral, 7 written, that had anything to do with Health 8 Canada. Do you remember that? 9 A Yes, I do remember. 10 Q All right. And it's been many hours, 11 but it was my understanding in response to that 12 question, you did indicate that you had sent an 13 e-mail to Daniel Krewski; is that correct? 14 MS. BRANSCOME: Objection. 15 THE WITNESS: I don't remember saying 16 that. 17 BY MS. PARFITT: 18 Q Okay, let me ask you. Have you ever 19 reached out to any member or author of the Taher 20 meta-analysis? 21 A I -- when I learned about it, I sent an 22 e-mail to Dan Krewski asking if this report was 23 intended for publication; and if so, when it would 24 appear, and I haven't -- I didn't have any 25 response.</p>

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<p>1 Q All right. So you have had no 2 communication with any of the authors of the Taher 3 study or any of the members of Health Canada? 4 A No. 5 Q Okay. Now, you were asked some 6 questions with regard to the Schildkraut study in 7 particular. Now, what I'd like you to do is, if 8 you can get that in front of you, and I believe 9 it's part of the documentation in your binder, 10 number 4. 11 And what I'd ask you to also do, if you 12 will, is pull out your paper, your Terry paper -- 13 your copy of the Terry paper, and maybe we'll go 14 there first. 15 A Terry? 16 Q If you get the Terry. Do you have the 17 Terry in front of you? 18 A Yeah, I've got it in front of me, yes. 19 Q Okay. Now, Ms. Branscome asked you and 20 referred you to the abstract of the Terry paper. 21 Do you recall that -- 22 A Yes. 23 Q -- examination? 24 A Yes. 25 Q And I believe she focused your attention</p>	<p>1 you? 2 A Yes, I do. 3 Q And I believe it's a continuation of the 4 Results section -- 5 A Yes. 6 Q -- which starts on 815 and continues all 7 the way over to the end of the document. Do you 8 see that? 9 A I do. 10 Q All right. And specifically about 11 halfway down on page 817 of the Results section of 12 the Terry paper, what did the authors find as it 13 pertains to whether or not there is evidence 14 demonstrating dose-response as it relates to 15 genital powder use and ovarian cancer? 16 A So are you referring to the sentence 17 that begins "Although a significant increase"? 18 Q Correct. 19 A Or before that? 20 Q Whatever you need to read, but I was 21 specifically -- 22 A Okay. 23 Q -- referring to the "although." And you 24 can read that paragraph, please. 25 A Okay. So I'll start at the beginning of</p>
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<p>1 on the very last sentence of the Terry paper, the 2 next to last sentence which started with "Among 3 genital powder users." 4 Do you see that? 5 A I see that. 6 Q All right. And she asked you whether or 7 not indeed the abstract section of the Terry paper 8 said: "Among genital powder users, we observed no 9 significant trend, p equals 0.17, in risk with 10 increasing numbers of lifetime applications 11 (assessed in quartiles)." 12 A I see that. 13 Q All right. You've had an opportunity to 14 read this -- 15 A I've read it -- 16 Q -- article? 17 A -- several times over the last three 18 years. 19 Q All right. Let me direct your attention 20 to the actual paper, and specifically to -- not 21 the abstract of the paper but to the section 22 that's entitled -- I believe it's the Discussion 23 section and it's over on page 817. 24 A Yes. 25 Q All right. Do you have that in front of</p>	<p>1 that paragraph. 2 Q Please, if you will. 3 A Read out loud? 4 Q If you will. 5 A "We evaluated cumulative genital powder 6 exposure as a composite variable of frequency and 7 duration of use. We have observed similar 8 increased risks of all nonmucinous subtypes of 9 epithelial ovarian cancer combined across 10 quartiles of genital powder compared with nonuse." 11 The OR in the first quartile is 1.18 with 12 confidence intervals. In the second quartile, it 13 was 1.22. In the third quartile, it's 1.22. And 14 the fourth quartile it's 1.37. 15 I didn't read the confidence intervals. 16 Q Are the confidence intervals for the 17 quartiles you just discussed all statistically 18 significant? 19 A Yes, they are. 20 Q All right. Please continue. 21 A "Although a significant increase in risk 22 with an increasing number of genital powder 23 applications was found for nonmucinous epithelial 24 ovarian cancer when nonusers were included in the 25 analysis with a p-value that's extremely small,"</p>

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<p style="text-align: right;">Page 298</p> <p>1 highly significant, "no trend in cumulative use 2 was evident in analyses restricted to ever users 3 of genital powder for trend .17. Taken together, 4 these observations suggest that the significant 5 trend test largely reflects the comparison of ever 6 regular use with never use." 7 Q Okay, and if you would stop there. 8 What is the significance of the findings 9 of the authors in that paragraph you just read as 10 it pertains to whether or not this study shows a 11 dose-response increase? 12 A Well, so my interpretation is that 13 overall there is, for users compared to nonusers, 14 a highly significant trend, and four -- among the 15 four - there are four quartiles, and there is a 16 fifth group called nonusers -- they have a 17 relative risk of 1.0. And in those five groups, 18 the relative risk -- the relative risk estimates 19 go from 1.0 to 1.18 to 1.22, 1.22, 1.3, 20 something, 7. Those five values indicate to me a 21 tendency of increasing risk with increasing 22 exposure. Whether it is -- whether there's formal 23 proof of that in a -- from a statistical 24 significance point of view is a secondary issue as 25 to compared with whether the data are compatible</p>	<p style="text-align: right;">Page 300</p> <p>1 Q The Draft Screening Assessment, right. 2 A Yes. 3 Q Okay. And specifically, let me direct 4 your attention to Roman number -- Roman numeral 5 III of that document. 6 A Yes. 7 Q Okay. 8 MS. BRANSCOME: Michelle, would you mind 9 helping me follow along? 10 MS. PARFITT: Oh, I'm sure. 11 MR. TISI: I can give you my copy. 12 MS. PARFITT: Sure. Absolutely. 13 MR. KLATT: You may want those. 14 MS. BRANSCOME: Thank you. What page 15 are we on? 16 MS. PARFITT: Counsel, I'm on Roman 17 numeral III. 18 MS. BRANSCOME: Oh, the page -- I had a 19 section number that I couldn't find -- 20 MS. PARFITT: No. At the bottom it has 21 a Roman numeral III. 22 BY MS. PARFITT: 23 Q Dr. Siemiatycki, referring you to the -- 24 first, second, third -- fourth full paragraph of 25 the Draft Screening Assessment, the fourth full --</p>
<p style="text-align: right;">Page 299</p> <p>1 with dose-response. 2 So as you may recall, in the IARC 2006 3 evaluation and in -- I guess in the Langseth 4 paper, I think we indicated that we were very 5 concerned about the consistency of increased 6 risks, but found no evidence of dose-response, and 7 that held back any inference that the 8 categorization should be greater than a 2B. 9 The findings from Terry turn on its head 10 the assumptions that were made at IARC that there 11 was no evidence of dose-response. Now there is 12 evidence of dose-response, whether or not it's 13 significant by one test or another test. 14 Q All right. Thank you. 15 All right. Let me direct your 16 attention, if I may, to the Health Canada 17 document, specifically the Draft Screening 18 Assessment dated December 2018. Again, I believe 19 it's in your notebook 4. 20 A 6 -- yeah. Yes. 21 Q All right. 22 A Okay, I have it. 23 Q Now -- now -- 24 A Sorry, the Taher or the Draft Screening 25 Assessment?</p>	<p style="text-align: right;">Page 301</p> <p>1 A Begins with "full"? 2 Q No, it begins with "The meta-analysis." 3 A "The meta-analysis." Yep. 4 Q Correct. 5 Would you please -- does it state: "The 6 meta-analysis of the" -- am I reading this 7 correctly? 8 "The meta-analysis of the available 9 human studies in the peer-reviewed literature 10 indicate a consistent and statistically 11 significant positive association between perineal 12 exposure to talc and ovarian cancer." 13 Did I read that correctly? 14 A Yes, you did. 15 Q All right. Is that your opinion, 16 Dr. Siemiatycki, based upon your review of the 17 totality of the literature on talc powder -- 18 talcum powder use and ovarian cancer in the 19 genital area? 20 A Yes, it is. 21 Q All right. It goes on to say: "Further 22 available data are indicative of a causal effect." 23 Did I read that correctly? 24 A Yes, you did. 25 Q All right. Is it your opinion based</p>

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<p>Page 302</p> <p>1 upon the totality of not only the epidemiological 2 data and findings but mechanistic data, animal and 3 in vivo data, that indeed the data is indicative 4 of a causal effect? 5 MS. BRANSCOME: Objection. 6 MR. KLATT: Objection. Form. 7 THE WITNESS: I believe it is more 8 likely than not that there is a causal 9 relationship between exposure to talc powder and 10 ovarian cancer. And if those two sentences are 11 taken to be equivalent, then I agree with the 12 sentence. 13 BY MS. PARFITT: 14 Q Well, let me ask you this, 15 Dr. Siemiatycki: You've read the draft 16 assessment, and do you have -- is it fair to say 17 that the methodology that the authors performed 18 throughout the course of this particular draft 19 assessment is the same type of methodology that 20 you have performed for purposes of preparing your 21 report and offering the opinions that you have and 22 will continue to offer the court in -- in the 23 litigation involving talcum powder use and ovarian 24 cancer? 25 MS. BRANSCOME: Objection.</p>	<p>Page 304</p> <p>1 assessment? 2 MS. BRANSCOME: Objection. 3 THE WITNESS: When you say 4 "methodology" -- 5 BY MS. PARFITT: 6 Q Mm-hmm. 7 A -- I'm not sure if you're referring to 8 sort of high level methodology like collecting 9 original data, evaluating it, weighing it, and 10 making inferences on the basis of that data. 11 BY MS. PARFITT: 12 Q What I'm asking is, did the authors 13 perform a Bradford Hill-like causality assessment 14 in the performance of their study entitled Draft 15 Screening Assessment? 16 MR. KLATT: Objection. Form. 17 THE WITNESS: You're saying in the pages 18 between 15 and -- 19 BY MS. PARFITT: 20 Q Correct. I'll shorten it by -- 21 A -- 21? 22 Q Correct. Correct. 23 And if I can refer your attention to or 24 direct you to page 20. 25 A They commented on various considerations</p>
<p>Page 303</p> <p>1 THE WITNESS: The authors of this report 2 I think include a group -- a multidisciplinary 3 group, including toxicologists and possibly 4 environmental scientists. I'm not familiar with 5 them, so I can't say for sure. And in that sense, 6 they cover a broader disciplinary background than 7 I cover myself. So in that sense, they have a 8 broader scope to evaluate the totality of the 9 evidence than I have. 10 Their evaluation of the epidemiologic 11 evidence seems in line with my own, and I have no 12 reason to doubt the validity of their toxicologic 13 analyses of the evidence. 14 BY MS. PARFITT: 15 Q All right. Dr. Siemiatycki, 16 specifically let me refer you to page 15, and it's 17 entitled "Perineal Exposure to Talc." And let me 18 know when you get there. 19 A Yes, I'm there. 20 Q All right. Based upon your review of 21 that section beginning on page 15, and I believe 22 it goes all the way through page 21, are you able 23 to -- do you have a sense as to the methodology 24 again that the authors of the draft assessment 25 employed in order to arrive at their causal</p>	<p>Page 305</p> <p>1 that Bradford Hill mentioned in his article. 2 Q And which ones did they provide 3 information and findings on? 4 A They commented on the strength of the 5 association, on consistency, specificity, 6 temporality, biological gradient, biological 7 plausibility, and coherence. 8 Q And what did the authors conclude -- 9 after looking at the various Bradford Hill 10 factors, what did they conclude in that last 11 paragraph of their Bradford Hill assessment? 12 A "Suggests a small but consistent 13 statistically significant positive association 14 between ovarian cancer and perineal exposure to 15 talc. Further available data are indicative of a 16 causal effect." 17 Is it -- is that what you're referring 18 to? 19 Q Yes. And do you agree with the authors 20 of the draft report of December 2018, when they 21 conclude that: "The most recent meta-analysis 22 detailed, Taher 2018, and consistent with the Hill 23 criteria suggest a small but consistent 24 statistically significant positive association 25 between ovarian cancer and perineal exposure to</p>

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<p>1 talc. Further available data are indicative of a 2 causal effect"? 3 A Yes. 4 MR. KLATT: Objection to form. 5 BY MS. PARFITT: 6 Q Thank you. All right. 7 Let me ask a couple other questions, and 8 I need you -- if you will, can you reach over 9 there, I believe it was exhibit number -- do you 10 see your book on occupational diseases? I think 11 it's under -- there you go. Okay. 12 Okay. Now, you were asked many hours 13 ago some questions regarding the book Risk Factors 14 for Cancer in the Workplace. 15 Do you recall that? 16 A Yes, I do. 17 Q All right. And that is indeed a book 18 that was authored by you, Jack Siemiatycki, 19 correct? 20 A Correct. 21 Q All right. And I believe you were asked 22 whether there was anything in your book that 23 described the methodology that you have employed 24 over the course, and I believe you said the last 25 four decades or almost four decades.</p>	<p>1 you have copies in that binder that you had 2 printed out. 3 MS. BRANSCOME: May I have a copy if he 4 is going to read from it? 5 MS. PARFITT: Absolutely. And I thought 6 we had -- do you have any copies in there? 7 THE WITNESS: Oh, for this -- 8 MS. PARFITT: No. 9 MR. TISI: It wasn't marked. It was in 10 the stuff you printed out. 11 MS. PARFITT: I think I've got one here. 12 (A discussion was held off the record.) 13 MS. PARFITT: Ms. Branscome, here you 14 go. Here's copies. 15 And let's have this marked as now 16 exhibit -- I'm not sure what we're up to. 17 MR. TISI: We're up to 18. 18. 18 MS. PARFITT: 18. Okay. 19 And for the record, we are marking the 20 face sheet of the book Risk Factors for Cancer in 21 the Workplace by Jack Siemiatycki, and 22 specifically the table -- 23 MS. BRENNAN: I have 16. 24 MR. TISI: No, because he marked -- 25 MS. BRENNAN: Yeah, 14 --</p>
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<p>1 Do you recall those questions? 2 A Yes, I do. 3 MS. BRANSCOME: Objection. 4 BY MS. PARFITT: 5 Q All right. Where in that book, if there 6 is something in that book, does it describe the 7 methodology that you have employed over the course 8 of the last four decades that you still employ 9 today in your analysis and opinions and findings 10 in the talcum powder product litigation and 11 ovarian cancer? 12 MS. BRANSCOME: Object to form. 13 THE WITNESS: I'm looking for -- well, I 14 guess the main thing I would -- I would summarize 15 that -- 16 BY MS. PARFITT: 17 Q And could you tell us for the record -- 18 A Yes. 19 Q -- Dr. Siemiatycki, where you are? 20 A Where I'm reading? 21 Q Yes, please. 22 A Thank you. I'm looking at page 298 in 23 this book, and I -- did you provide a copy of that 24 chapter? 25 MR. TISI: Doctor, you have copies --</p>	<p>1 MR. KLATT: Actually, it should be 16. 2 MS. PARFITT: 16? Thank you. 16. 3 All right. We are now marking as 4 Exhibit 16 the book entitled Risk Factors for 5 Cancer in the Workplace by Dr. Jack Siemiatycki, 6 which specifically includes the table of contents, 7 Chapter 7, "Interpretation of Findings," pages 297 8 through 308. 9 MR. DONATH: Is that an excerpt, not the 10 whole thing? 11 MS. PARFITT: It is -- it is not. We'll 12 make the book available, but it's just the 13 excerpt. 14 (Exhibit No. 16 was marked for 15 identification.) 16 MS. BRANSCOME: Did someone just join 17 the line? 18 THE REPORTER: They hung up. 19 THE WITNESS: Shall I read a couple of 20 paragraphs from this? 21 BY MS. PARFITT: 22 Q Well, the question was -- the question 23 was whether or not there was any bases or writings 24 that discussed the methodology that you've 25 employed over the last four decades, and you</p>

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<p style="text-align: right;">Page 310</p> <p>1 commented that it was in your book. 2 MS. BRANSCOME: Object -- 3 BY MS. PARFITT: 4 Q So please tell us what's in your book. 5 MS. BRANSCOME: Object to form. 6 THE WITNESS: Well, I -- I won't read 7 the whole book. 8 BY MS. PARFITT: 9 Q I appreciate that. We all -- 10 A I have a phone book downstairs that I 11 could -- no, I will just read a couple of 12 paragraphs that talk about interpreting and 13 conducting epidemiologic research in general, not 14 specifically related to this particular study -- 15 set of studies that I describe in the book. 16 "The main purpose of epidemiology is to 17 find the cause of disease. Despite some 18 controversy concerning the validity of drawing 19 causal inferences in epidemiology. There is a 20 consensus that sanctions and provides guidelines 21 for the practice. The evaluation of causality 22 between a putative risk factor and disease is a 23 complex and subjective process. Equally competent 24 scientists examining the same information can 25 arrive at different conclusions. However, as</p>	<p style="text-align: right;">Page 312</p> <p>1 Is that what you were -- 2 Q That's what I wanted to know. 3 A -- asking? 4 Q Thank you. All right. 5 Now, do you recall, Dr. Siemiatycki, 6 that you were asked some questions about the 7 mechanism underlying exposure to talc and genital 8 use of talcum powder products and ovarian cancer? 9 Do you remember Ms. Branscome asked you some 10 questions about that? 11 A The mechanism of exposure or the 12 mechanism of carcinogenesis? 13 Q The mechanism of exposure -- 14 A Okay. 15 Q -- between talcum powder products and 16 ovarian cancer. Do you remember there were a 17 series of questions that were asked about that? 18 MS. BRANSCOME: Object to form. 19 THE WITNESS: I'm -- I'm not -- 20 BY MS. PARFITT: 21 Q Okay. Let me -- okay. Let me -- let me 22 do this. Let me refer you to your report, if you 23 will, and I believe it's been marked as -- I think 24 this is 10 -- as 10. 25 Do you have your report in front of you?</p>
<p style="text-align: right;">Page 311</p> <p>1 additional evidence is accumulated, beliefs and 2 consensuses may change. The criteria that are 3 most relevant to the problem of evaluating 4 causality between cancer and an antecedent 5 occupational exposure may be paraphrased as 6 follows: 7 Number 1: "Is sampling variability a 8 plausible explanation for the observed 9 association?" 10 Number 2: "How strong is the 11 association and is there a dose-response 12 relationship?" 13 Number 3: "Is bias or confounding a 14 plausible explanation for the observed 15 association?" 16 Number 4: "Is the association 17 biologically plausible?" 18 Number 5: "Is there relevant supporting 19 evidence from other epidemiologic studies or from 20 non-human test systems, such as animal 21 experimentation or tests of mutagenicity?" 22 I'll stop there. But in answer to your 23 question, this text, published 30 years ago now, 24 encapsulates my approach to how to interpret and 25 use epidemiologic evidence in assessing causality.</p>	<p style="text-align: right;">Page 313</p> <p>1 A Yes. 2 Q Very good. Okay. 3 All right. And specifically I'm 4 referring to page 64 and 65. 5 A So I'm one or two pages off, so just 6 tell me which section. 7 Q Okay. I believe it's -- it's under 8 "Biological Plausibility." Do you see that in the 9 lower part? Let's see. 10 A "Biological Plausibility" -- (reading to 11 himself.) Strength. Okay. I've got it 12 somewhere -- consistency. Here. 13 Q Okay. 14 A "Biological Plausibility," yes. 15 Q Now, I specific -- I believe 16 specifically the question that you were asked is 17 whether or not you will be testifying with regard 18 to the mechanism and the biological mechanism for 19 causing cancer with genital use of talcum powder 20 products. Do you remember that? 21 A Yes. 22 Q Okay. Now, in the course of your 23 analysis and in looking at that issue of 24 biological mechanism for causing cancer, what did 25 you consult and review and assess for purposes of</p>

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<p style="text-align: right;">Page 314</p> <p>1 formulating your opinions on that topic? 2 MS. BRANSCOME: Objection. 3 THE WITNESS: I actually started with 4 the IARC 2006 report where there was a high level 5 subgroup of toxicologists and basic scientists who 6 reviewed the evidence. So I read that material. 7 I've read various articles concerning 8 migration of particles, articles about 9 inflammation as a carcinogenic process, oxidative 10 stress as part of the carcinogenic process. And 11 towards the end, started looking at articles about 12 asbestos in talc as filling in some of the 13 information about what the content of talcum 14 powder products were. I at one point was looking 15 at company documents to try to figure out what 16 were the time relationships of using talc versus 17 using substitutes for talc. So all of those kinds 18 of things I was looking for. 19 BY MS. PARFITT: 20 Q So for purposes of evaluating the 21 evidence and opining on the issue of talcum powder 22 products and ovarian cancer, did you consider the 23 issue of biological plausibility? 24 MS. BRANSCOME: Objection. 25 THE WITNESS: Yes, I considered it.</p>	<p style="text-align: right;">Page 316</p> <p>1 causality. 2 So the bar for establishing plausibility 3 for me is, are there credible scientists who are 4 persuaded or have reasonable confidence that there 5 is a mechanism that can explain the observation. 6 And if so, I would defer to that point of view as 7 being plausible. 8 I would not accept that one or more 9 scientists developing a mechanistic theory are 10 definitely proven, but if there is a credible 11 point of view in the scientific community about 12 the mechanism, I would call that plausible. It 13 doesn't mean it's proven. It's plausible. 14 And to my satisfaction, when I looked at 15 the different reports, including reports of 16 experts in the litigations, I was reasonably 17 assured that there are plausible theories and 18 plausible hypotheses. 19 Q All right. In your section of your 20 expert report on page 64 through 66, did the 21 factors you identify under the subtitle 22 "Biological Plausibility" provide support for your 23 opinions that indeed there is biological 24 plausibility between the use of genital use of 25 talcum powder products and ovarian cancer?</p>
<p style="text-align: right;">Page 315</p> <p>1 BY MS. PARFITT: 2 Q All right. And what was the basis of 3 your opinion as to whether or not there was 4 biological plausibility between talcum powder 5 product use in the genital area and ovarian 6 cancer? 7 MS. BRANSCOME: Objection. Assumes he 8 formed an opinion. 9 THE WITNESS: Well, my -- 10 BY MS. PARFITT: 11 Q Dr. Siemiatycki, did you formulate an 12 opinion with regard to whether there was 13 biological plausibility between the use of talcum 14 powder products and ovarian cancer? 15 A Yes, I did. 16 Q Okay. 17 A And the first part of the discussion is 18 what one means by "plausibility." And so one 19 issue that I took off the table quite soon is the 20 notion that biological plausibility is synonymous 21 with biological proof. Neither Bradford Hill nor 22 anyone else who has described the use of 23 biological plausibility as a criterion has ever 24 claimed that biological proof of a mechanism is 25 necessary before you can opine about the -- about</p>	<p style="text-align: right;">Page 317</p> <p>1 A I think they provide evidence of 2 plausibility for those theories. 3 Q And did you consider those for purposes 4 of opining that talcum powder products in the 5 genital area, used, can cause ovarian cancer? 6 A Yes, I considered them. 7 Q All right. Dr. Siemiatycki, I'm not 8 sure of the -- I don't think we marked it as an 9 exhibit, so let me do that now. I believe we're 10 up to 17. 11 (A discussion was held off the record.) 12 (Exhibit No. 17 was marked for 13 identification.) 14 BY MS. PARFITT: 15 Q All right. Dr. Siemiatycki, do you 16 recall the discussion you had with Ms. Branscome, 17 again several hours ago, on the issue of 18 confounding and how that can impact study designs? 19 A Oh, yes. 20 Q All right. Let me show you a document 21 we have marked as Exhibit No. 17, and it's 22 entitled "Degree of confounding bias related to 23 smoking ethnic group, and socioeconomic status and 24 estimates of the association between occupation 25 and cancer," and I believe that's an article that</p>

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<p>1 you were an author, correct?</p> <p>2 A That's correct, yes.</p> <p>3 Q All right. What, if any, support did</p> <p>4 that particular article that you wrote, I guess</p> <p>5 back in 1988, provide, if any, for the opinions</p> <p>6 that you've rendered in this case on the topic of</p> <p>7 confounding and bias?</p> <p>8 A In this study we evaluated 75</p> <p>9 associations, 25 occupations in relation to lung</p> <p>10 cancer, to bladder cancer and to stomach cancer,</p> <p>11 each of them. And we looked at the association</p> <p>12 between each occupation and each of the three</p> <p>13 types of cancer, adjusting for the smoking history</p> <p>14 of the patients and the subjects. But another set</p> <p>15 of analyses not adjusting for their smoking</p> <p>16 histories, and their socioeconomic status and</p> <p>17 their ethnic group. These are factors that are</p> <p>18 strongly associated with cancer and with different</p> <p>19 occupations. We wanted to see how large a</p> <p>20 confounding bias could be generated by not having</p> <p>21 proper confounder information.</p> <p>22 And so I will just read a couple of</p> <p>23 sentences from the abstract of this article.</p> <p>24 "Of the 75 associations studied, only</p> <p>25 one OR was distorted by more than 40 percent. A</p>	<p>1 low probability.</p> <p>2 And this is part of what leads me and</p> <p>3 what led me in my report to opine that confounding</p> <p>4 is unlikely to be the explanation for the observed</p> <p>5 relative risks.</p> <p>6 Q Thank you. All right.</p> <p>7 THE VIDEOGRAPHER: Excuse me, Counsel.</p> <p>8 MS. PARFITT: Off the record, yes.</p> <p>9 THE VIDEOGRAPHER: Off the record?</p> <p>10 MS. PARFITT: Yeah, it's a good time,</p> <p>11 because you're running out of tape. I could tell.</p> <p>12 THE VIDEOGRAPHER: Going off the record</p> <p>13 at 8:27 p.m.</p> <p>14 (Recess.)</p> <p>15 THE VIDEOGRAPHER: We're going back on</p> <p>16 the record at 8:31 p.m.</p> <p>17 MS. PARFITT: Thank you.</p> <p>18 BY MS. PARFITT:</p> <p>19 Q Dr. Siemiatycki, just one last question.</p> <p>20 Let me direct your attention to again</p> <p>21 the documents in your Exhibit No. 4, specifically</p> <p>22 the "Weight of Evidence: General Principles and</p> <p>23 Current Applications at Health Canada," which</p> <p>24 formed part of the Health Canada recommendation.</p> <p>25 All right?</p>
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<p>1 40 percent distortion would correspond to an odds</p> <p>2 ratio of 1.4 when comparing unadjusted with</p> <p>3 adjusted estimates. Three were distorted by</p> <p>4 between 30 percent and 40 percent, and four others</p> <p>5 by between 20 percent and 30 percent."</p> <p>6 So of these 75 associations, not taking</p> <p>7 account of very powerful confounders -- smoking is</p> <p>8 the most powerful confounder we know. Ethnicity</p> <p>9 and socioeconomic status are important</p> <p>10 confounders. They have strong relative risks with</p> <p>11 these different cancers. Not taking them into</p> <p>12 account could create artifactual odds ratios,</p> <p>13 maximum of 1.4, even though the original odds</p> <p>14 ratios of the confounders with these cancers could</p> <p>15 be as high as 10.</p> <p>16 So there's a very -- the confounding</p> <p>17 effect, at most, would be 10 percent or 20</p> <p>18 percent, but the likelihood that there is some</p> <p>19 unknown confounder with -- with ovarian cancer</p> <p>20 that is artifactually creating across the board,</p> <p>21 across all these studies, an artifactual relative</p> <p>22 risk of around 1.3 would require some -- that</p> <p>23 unknown confounder to have an extremely high</p> <p>24 relative risk, certainly higher than 2, maybe</p> <p>25 higher than 3 or 4, which is not inconceivable but</p>	<p>1 A I'm not sure if it formed part of the</p> <p>2 recommendation or if it's a background document.</p> <p>3 Q Very good. I think you're probably</p> <p>4 right.</p> <p>5 All right. And you have -- you have had</p> <p>6 a chance to review that, correct?</p> <p>7 A Yes.</p> <p>8 Q All right. Specifically let me direct</p> <p>9 your attention to page 7 of that document. And</p> <p>10 I'm going to go down to the very last paragraph,</p> <p>11 and it starts with: "The majority of risk</p> <p>12 assessment reports, however, provide a logical</p> <p>13 narrative description of the relative strengths or</p> <p>14 weakness of various lines of evidence considered.</p> <p>15 For most risk assessments, individual lines of</p> <p>16 evidence are polled and integrated into a final</p> <p>17 conclusion based on best professional judgment and</p> <p>18 not mathematical formula."</p> <p>19 Did I read that correctly?</p> <p>20 A Yes, you did.</p> <p>21 Q Do you agree with the statement by</p> <p>22 Health Canada in their "Weight of Evidence:</p> <p>23 General Principles"?</p> <p>24 A Yes, I do.</p> <p>25 MS. PARFITT: All right. I have no</p>

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<p>1 further questions. Thank you.</p> <p>2 THE WITNESS: This is also in conformity</p> <p>3 with all guidelines from agencies and experts who</p> <p>4 understand science.</p> <p>5 MS. PARFITT: Very good.</p> <p>6 THE WITNESS: The best data is</p> <p>7 collected, compiled, and then interpreted by human</p> <p>8 expert judgment.</p> <p>9 MS. PARFITT: Thank you very much,</p> <p>10 Dr. Siemiatycki. I believe counsel has some</p> <p>11 follow-up.</p> <p>12 MS. BRANSCOME: I do, but I think I need</p> <p>13 to take a break to confer amongst ourselves.</p> <p>14 MS. PARFITT: Go ahead.</p> <p>15 THE VIDEOGRAPHER: We're going off the</p> <p>16 record at 8:33 p.m.</p> <p>17 (Recess.)</p> <p>18 THE VIDEOGRAPHER: We are going back on</p> <p>19 the record at 8:46 p.m.</p> <p>20 REDIRECT EXAMINATION</p> <p>21 BY MS. BRANSCOME:</p> <p>22 Q Good evening, Dr. Siemiatycki.</p> <p>23 I have some follow-up questions to the</p> <p>24 questions that were just asked to you by</p> <p>25 plaintiffs' counsel.</p>	<p>1 gist of it was whether the paper has been or will</p> <p>2 be submitted for publication. I don't recall if</p> <p>3 there were other important components. It was a</p> <p>4 brief message, besides pleasantries of people</p> <p>5 who've known each other for 30 years.</p> <p>6 But, you know, I said I -- I've learned</p> <p>7 about this work that you were involved with. I</p> <p>8 can't remember what else I said.</p> <p>9 Q In your e-mail communication to</p> <p>10 Dr. Krewski, did you alert him to the fact that</p> <p>11 you were serving as a -- an expert on behalf of</p> <p>12 plaintiffs' counsel in litigation involving talcum</p> <p>13 powder?</p> <p>14 A I don't recall. Your question used the</p> <p>15 plural, and in my -- you said "in your</p> <p>16 communications." That's what I heard. No? Okay.</p> <p>17 Q I meant it in the singular.</p> <p>18 A You meant it in the singular, so I guess</p> <p>19 the record will reflect.</p> <p>20 In my one message to Dr. Krewski -- let</p> <p>21 me -- if I may.</p> <p>22 Q My question again, Dr. Siemiatycki --</p> <p>23 A Yeah, please.</p> <p>24 Q -- is in your e-mail to Dr. Krewski with</p> <p>25 respect to the Taher paper, did you notify him in</p>
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<p>1 Both myself and counsel for Imerys asked</p> <p>2 you very specifically if you had had contact with</p> <p>3 any of the authors in connection with the Taher</p> <p>4 paper or the Health Canada paper. Do you recall</p> <p>5 the questions that we asked you?</p> <p>6 A I -- I recall that you asked questions</p> <p>7 about it, yes.</p> <p>8 Q Yeah. Is there a reason why during my</p> <p>9 questioning and questioning by counsel for Imerys</p> <p>10 you did not recall having sent an e-mail to</p> <p>11 Dr. Krewski with respect to the potential</p> <p>12 publication of the Taher paper?</p> <p>13 A I -- I guess I consider -- well, two</p> <p>14 parts. I consider a contact sort of a two-way</p> <p>15 process, and there was no two-way process. I sent</p> <p>16 him a message. He never responded.</p> <p>17 And number two, it -- it dropped off of</p> <p>18 my memory screen. I -- I just forgot about it</p> <p>19 until she asked.</p> <p>20 Q When did you contact Dr. Krewski about</p> <p>21 the Taher paper?</p> <p>22 A In December, when I first learned about</p> <p>23 it.</p> <p>24 Q What specifically did you ask him?</p> <p>25 A My recollection, I asked him if -- the</p>	<p>1 that e-mail that you were serving as an expert</p> <p>2 witness retained on behalf of plaintiffs' counsel</p> <p>3 in litigation involving talcum powder?</p> <p>4 A I -- I -- I don't recall if I did or</p> <p>5 not. I -- I wouldn't have thought it was a</p> <p>6 crucial thing to indicate in this first message</p> <p>7 asking him if his paper was in press or in</p> <p>8 publication or something like that.</p> <p>9 Q Why did you want to know whether it had</p> <p>10 been submitted for publication?</p> <p>11 A I wanted to know what the status of that</p> <p>12 report was. I had no -- I didn't follow up my --</p> <p>13 it wasn't an important issue for me. I was -- it</p> <p>14 was kind of an idle gesture of, you know, Hi, I</p> <p>15 haven't heard from you for a while. I see that</p> <p>16 you have this thing. Are you sending it for</p> <p>17 publication? Something like that.</p> <p>18 And I -- the motivation, was there a</p> <p>19 specific ulterior motive? No, there was no --</p> <p>20 there was nothing I would have done differently.</p> <p>21 I guess if he had told me, yes, it's about to be</p> <p>22 submitted, I would have wanted to see the final</p> <p>23 version, because the version that I saw was</p> <p>24 obviously an early manuscript. It was much too</p> <p>25 long for a -- for a publication submission. But</p>

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<p>1 it wasn't a big deal for me to -- to have 2 information about that manuscript. 3 Q Including communications in which you 4 unilaterally reached out to individuals but may 5 not have received a response, have you 6 communicated in any form with any of the 7 participants in the development of the Health 8 Canada Draft Screening Assessment or the Taher 9 paper, other than what we have discussed with 10 respect to Dr. Krewski? 11 A No. 12 Q The Health Canada Draft Screening 13 Assessment, you were asked a number of questions 14 about that by counsel for plaintiffs. Is that a 15 document that you have reviewed closely in forming 16 your opinions in this case? 17 MS. PARFITT: Objection. Form. 18 THE WITNESS: I wouldn't say that I 19 reviewed it closely the way I've reviewed the 20 evidence before submitting my report. No. 21 BY MS. BRANSCOME: 22 Q All right. I want to talk to you about 23 Exhibit 17. You have that over there. It's the 24 "Degree of confounding bias related to smoking." 25 A Oh, yeah.</p>	<p>1 Did I read that correctly? 2 MS. PARFITT: Counsel, just with one 3 correction. It came out as "estimates." The 4 article says "estimates," and it came out on the 5 transcript as "assessments." 6 MS. BRANSCOME: Okay. 7 THE WITNESS: That -- do you understand 8 what she's indicated? 9 BY MS. BRANSCOME: 10 Q Yes. Did I read it correctly? 11 A You misread one word. 12 Q Okay. 13 A But it's not important, but if you want 14 to have it for the record. 15 Q Well, we can continue on. 16 A Yes. 17 Q "This consideration follows from the 18 recognition that some degree of bias is quite 19 likely in any non-experimental study." 20 Did I read that correctly? 21 A Yes. 22 Q "Small excess relative risks, even if 23 they are statistically significant, are often 24 interpreted with great caution, if not 25 skepticism."</p>
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<p>1 Q All right. Dr. Siemiatycki, is 2 Exhibit 17 an article that you identified to 3 address the likelihood that a confounding variable 4 could explain the increased risk that you have 5 found in your meta-analysis with respect to the 6 use of talc? 7 A Yes. 8 Q Okay. So I just want to direct you to 9 page 623. In the right-hand column, do you see a 10 paragraph that begins "One of the criteria"? 11 A Yes. 12 Q Does it state: "One of the criteria 13 used by epidemiologists to distinguish true from 14 false associations is the strength of the 15 association"? Did I read that correctly? 16 A Yes, you did. 17 Q And again, this is an article on which 18 you are the lead author, correct? 19 A Correct. 20 Q It continues on: "That is, among two 21 relative risk assessments which have equal levels 22 of statistical significance but one of which is 23 much greater than 1, while the other is closer 24 to 1, the larger one is considered more likely to 25 reflect a true association than the smaller one."</p>	<p>1 Did I read that correctly? 2 A Yes. 3 Q "Although there has been no explicit 4 consensus on what level of excess relative risk 5 should be considered too small to be taken 6 seriously, we believe that many epidemiologists 7 use a cut point in the range of 1.2 to 1.5 for 8 this purpose. Our results indicate that a cut 9 point in this range is reasonable for studies of 10 cancer occupation associations." 11 Did I read that correctly? 12 A Yes, you did. 13 Q And the references in those sentences to 14 the words "we" and "our" would include you, 15 Dr. Siemiatycki, correct? 16 A Correct. 17 Q And then if we could turn the page to 18 page 624, the paragraph at the top on the 19 left-hand column, I direct your attention to the 20 last complete sentence of that paragraph. 21 "On the other hand, our results also 22 imply that relative risk estimates as low as 1.2 23 for lung cancer associations or 1.1 for bladder or 24 stomach cancer associations run a fair chance of 25 being attributable to confounding bias, even if</p>

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<p style="text-align: right;">Page 330</p> <p>1 they are," quote, "statistically significant." 2 Did I read that correctly? 3 A Yes, you did. 4 Q Is that a conclusion that you and your 5 authors reached in the paper that's been 6 identified as Exhibit 17? 7 A Yes, it was. 8 Q Your opinion with respect to the 9 existence of biological plausibility of the 10 perineal use of talc and ovarian cancer is limited 11 to the evaluation of whether or not there are 12 credible scientists who are persuaded that there 13 is a mechanism; is that correct? 14 MS. PARFITT: Objection. Form. 15 THE WITNESS: Can you repeat that? I'm 16 sorry. 17 BY MS. BRANSCOME: 18 Q Your opinion with respect to the 19 existence of biological plausibility of the 20 perineal use of talc and its potential to cause 21 ovarian cancer is limited to an evaluation of 22 whether or not there are credible scientists who 23 are persuaded that there is a mechanism, correct? 24 MS. PARFITT: Objection. Form. 25 Misstates his testimony.</p>	<p style="text-align: right;">Page 332</p> <p>1 MS. PARFITT: Object to form. 2 THE WITNESS: Correct. 3 BY MS. BRANSCOME: 4 Q You indicated in response to questions 5 by plaintiffs' counsel that you were persuaded by 6 the opinions of other experts in the litigation 7 with respect to biological plausibility. Who are 8 those experts? 9 A I -- I think I indicated that such 10 experts contributed to the information that I had, 11 not that they were the only ones who persuaded me. 12 So there was literature and there were depositions 13 and reports. 14 So -- I'm trying to remember the names 15 of the various expert reports that I have read and 16 depositions. I do -- there's the Plunkett, the 17 Saed papers, but I don't know if there was a 18 report by Saed. There was -- let me look in my 19 list of references. (Peruses document.) 20 I'm sorry, I'm drawing a blank on the 21 names of the people whose reports and testimonies 22 I've read in the last month or two. 23 Q When were you provided with copies of 24 these expert reports? 25 A In the fall. Some before November 15th</p>
<p style="text-align: right;">Page 331</p> <p>1 THE WITNESS: I would say is based on, 2 rather than is limited to. 3 BY MS. BRANSCOME: 4 Q Do you have expertise that would allow 5 you to determine what the most likely biological 6 mechanism is, if there is one, for perineal use of 7 talc to cause ovarian cancer? 8 A No, I wouldn't pretend to -- to have 9 that kind of expertise. 10 Q Okay. Is it also true that you are not 11 qualified to opine on the ability or not of talc 12 particles to migrate to the ovaries from the use, 13 the perineal application of talc? 14 MS. PARFITT: Objection. Form. 15 THE WITNESS: Not on the basis of my 16 research, not on the basis of my training, but on 17 the basis of my reading of literature concerning 18 that issue, I have an opinion based on what I've 19 read from experts in the -- that field. 20 BY MS. BRANSCOME: 21 Q But in forming that opinion, you are 22 relying on -- 23 A Yes. 24 Q -- the expertise of others, correct? 25 A Yes.</p>	<p style="text-align: right;">Page 333</p> <p>1 and some after November 15th. And -- but also 2 I'm -- I'm reflecting on the various reports and 3 testimonies from the earlier trial, and I read 4 various expert reports from that time. 5 Q Did you draft the section in your MDL 6 expert report related to biologic plausibility? 7 A Yes, I did. 8 Q You personally summarized each of the 9 various studies that you refer to in that section? 10 A What do you mean by summarized the 11 studies? I -- I summarized the evidence that's 12 captured there, and I provided references for 13 those statements, yes. 14 Q You're the original author of the 15 language in that section is my question. 16 A Yes. Yes. 17 Q Can you identify for me which expert 18 reports related to biological plausibility you had 19 reviewed before forming your opinion as 20 represented in the MDL report? 21 A As I said, it's partly a number of 22 reports that I had seen in the previous trial, and 23 I -- I'm drawing a blank on the names of -- of the 24 people. 25 Q You understand that there will be</p>

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<p>1 experts retained by defense counsel who will 2 provide reports addressing biological 3 plausibility, correct? 4 A I assume so, yeah. 5 Q Okay. Are you qualified to evaluate 6 between competing expert reports who is correct 7 about the biological mechanism? 8 MS. PARFITT: Objection. Form. 9 BY MS. BRANSCOME: 10 Q To the extent one exists. 11 MS. PARFITT: Objection. Form. 12 THE WITNESS: No -- no, I wouldn't be. 13 I mean I -- I can read reports from people outside 14 my area and form an opinion about the general 15 coherence and -- and form an initial sense of the 16 credibility of the various reports. And I'd be 17 happy to review the reports of the experts for the 18 defense on these issues. 19 BY MS. BRANSCOME: 20 Q But to the extent, for example, that 21 there are credible experts on both sides of the 22 debate, whether or not there has been an 23 established biological mechanism and whether or 24 not there have not been, you are not qualified to 25 evaluate between the two credible experts?</p>	<p>1 THE VIDEOGRAPHER: We are going off the 2 record at 9:05 p.m. 3 (Pause in the proceedings.) 4 THE VIDEOGRAPHER: We're back on the 5 record at 9:06 p.m. 6 MS. BRANSCOME: At this time I will pass 7 questioning to counsel for Imerys. 8 MS. PARFITT: Thank you. 9 REDIRECT EXAMINATION 10 BY MR. KLATT: 11 Q Dr. Siemiatycki, a few more questions, 12 sir. 13 I'm going to read a statement and ask if 14 you agree with it. Okay? 15 A Yes. 16 Q "When a pronounced binary association is 17 present, use of the never or no category in 18 assessing trend can induce a trend where none 19 exists." 20 A Okay. Can you -- yeah, thank you. 21 Q And my question is, do you agree or 22 disagree with that statement? 23 A Yes, I agree it can -- I agree with it. 24 There are some qualifiers that I would add to that 25 sentence, but I agree with it.</p>
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<p>1 MS. PARFITT: Objection. Form. 2 THE WITNESS: That's correct. And I've 3 never pretended that -- make -- that it is 4 necessary for me to establish the correct 5 biological mechanism before drawing inferences 6 about causality. 7 BY MS. BRANSCOME: 8 Q It is your conclusion that more likely 9 than not perineal use of talc can cause ovarian 10 cancer is based on the epidemiological evidence, 11 correct? 12 MS. PARFITT: Objection. Misstates his 13 evidence and testimony today. 14 THE WITNESS: In part -- in large part. 15 Yes. 16 BY MS. BRANSCOME: 17 Q Okay. Well, my question now is about 18 the, in small part, the evidence in addition to 19 that. What evidence are you considering that you 20 are qualified to independently evaluate? 21 A I am qualified to evaluate whether there 22 is a plausible theory about it. Not to establish 23 whether that theory is correct or not. 24 MS. BRANSCOME: Okay. All right. If we 25 could just go off the record very briefly.</p>	<p>1 Q Could you look at your report, please, 2 sir, in the case on page 65, the discussion of 3 biologic plausibility. 4 A Yes. 5 Q And actually I think your biologic 6 plausibility discussion actually begins near the 7 bottom of the previous page, 64, and there's a 8 general discussion on the rest of 64 and the first 9 paragraph or two of 65. Is that correct? 10 A I -- I believe it's correct. The 11 version I have in front of me is that version that 12 has a slightly different formatting, so -- but I'm 13 with you. 14 Q Okay. 15 MS. PARFITT: And I believe, just for 16 completeness, it starts on 60 -- 17 THE WITNESS: Mine starts on -- 18 MS. PARFITT: His document starts on 65, 19 goes all the way over to 66. Mike, yours probably 20 starts on the bottom of 64, goes all the way over 21 to the top of 66. 22 BY MR. KLATT: 23 Q And what I'm focusing on is the 24 paragraph that you wrote that begins with 25 "Insofar" --</p>

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<p style="text-align: right;">Page 338</p> <p>1 A Yes.</p> <p>2 Q -- which is where your specific</p> <p>3 discussion of biologic plausibility regarding</p> <p>4 talcum powder products begins.</p> <p>5 A Yes.</p> <p>6 Q Do you -- do you see that paragraph,</p> <p>7 sir?</p> <p>8 A Yes, I do.</p> <p>9 Q And moving down, did you read the</p> <p>10 articles that you cited here carefully?</p> <p>11 A I read them. I'm not capable of fully</p> <p>12 understanding articles in areas that are outside</p> <p>13 my area of -- of expertise. But to the --</p> <p>14 Q Well --</p> <p>15 MS. PARFITT: Wait, let him finish.</p> <p>16 THE WITNESS: To the extent that I was</p> <p>17 able to understand them, I read these articles.</p> <p>18 BY MR. KLATT:</p> <p>19 Q I'm focusing on the sentence that you</p> <p>20 wrote in your report saying: "First of all, there</p> <p>21 are two possible routes that talcum powder</p> <p>22 products can take to reach the ovaries."</p> <p>23 Do you see where I am?</p> <p>24 A Yes, I do.</p> <p>25 Q The next sentence says: "There is</p>	<p style="text-align: right;">Page 340</p> <p>1 A I think so. Is this --</p> <p>2 Q And the --</p> <p>3 A Is this the South African study?</p> <p>4 Q I believe you're right.</p> <p>5 A Okay.</p> <p>6 Q And the women were not women using</p> <p>7 perineal talc. They were women who were being</p> <p>8 prepared to undergo gynecologic surgery, correct?</p> <p>9 A Correct.</p> <p>10 Q And after this solution of albumin</p> <p>11 microspheres was injected at the top of the</p> <p>12 vaginal vault, the women were tilted in a head</p> <p>13 down/pelvis up position for two hours beforehand,</p> <p>14 correct?</p> <p>15 A Correct.</p> <p>16 Q So --</p> <p>17 A Now I'm saying correct, but I don't</p> <p>18 remember the details that you're quoting. I</p> <p>19 remember the article. I'm -- I -- it doesn't --</p> <p>20 my recollection doesn't contradict anything you're</p> <p>21 saying.</p> <p>22 Q So Venter doesn't tell us anything at</p> <p>23 all about dry talc particles applied externally to</p> <p>24 the genital area being able to migrate up the</p> <p>25 vagina, across the cervix, up the uterus, up the</p>
<p style="text-align: right;">Page 339</p> <p>1 published evidence that talcum powder products and</p> <p>2 its constituents and contaminants that are applied</p> <p>3 to the vaginal area can migrate from there to the</p> <p>4 fallopian tubes and ovaries," citing Venter 1979,</p> <p>5 Henderson 1986, Heller 1996, "or to pelvic lymph</p> <p>6 nodes," citing Cramer 2007.</p> <p>7 Is that correct?</p> <p>8 A Yes, that's correct.</p> <p>9 Q Do you recall, Dr. Siemiatycki, that the</p> <p>10 Venter 1979 article has nothing to do with talc at</p> <p>11 all?</p> <p>12 MS. PARFITT: Objection. Form.</p> <p>13 THE WITNESS: Is that the article about</p> <p>14 asbestos?</p> <p>15 BY MR. KLATT:</p> <p>16 Q Venter 1979 is the article about albumin</p> <p>17 microspheres.</p> <p>18 A Oh, yeah. Yes.</p> <p>19 Q Do you recall that article?</p> <p>20 A I do. Well, I don't recall it well, but</p> <p>21 I recall reading it a year or two ago.</p> <p>22 Q And in Venter, nothing was applied to</p> <p>23 the perineal area, correct? These albumin</p> <p>24 microspheres were actually injected at the top of</p> <p>25 the vaginal vault, correct?</p>	<p style="text-align: right;">Page 341</p> <p>1 fallopian tubes to the ovaries, correct?</p> <p>2 MS. PARFITT: Objection. Form.</p> <p>3 THE WITNESS: I guess I use this as a</p> <p>4 reference because some other experts used it as a</p> <p>5 reference for such a statement. And I read the</p> <p>6 article, and it sounded plausible.</p> <p>7 BY MR. KLATT:</p> <p>8 Q But you'd agree with me that the Venter</p> <p>9 1979 article doesn't involve talc particles,</p> <p>10 doesn't involve external application, and is a</p> <p>11 very artificial situation compared to the</p> <p>12 situation of women applying talc to the --</p> <p>13 MS. PARFITT: Objection.</p> <p>14 BY MR. KLATT:</p> <p>15 Q -- external genital area?</p> <p>16 MS. PARFITT: I'm sorry, Michael.</p> <p>17 Objection. Form.</p> <p>18 THE WITNESS: I -- I -- I don't disagree</p> <p>19 with what you said.</p> <p>20 BY MR. KLATT:</p> <p>21 Q And then the other two articles you</p> <p>22 cite, Henderson 1986 and Heller 1996, say nothing</p> <p>23 at all about migration of talc particles. They</p> <p>24 simply observe talc particles in tissue already</p> <p>25 without any reference to how they got there,</p>

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<p>1 correct?</p> <p>2 MS. PARFITT: Do you need to see the</p> <p>3 articles?</p> <p>4 THE WITNESS: Yes, I think I need to see</p> <p>5 those articles.</p> <p>6 MS. PARFITT: Do we have Henderson or</p> <p>7 Heller?</p> <p>8 MR. KLATT: I'm sorry, I don't have them</p> <p>9 with me.</p> <p>10 MS. PARFITT: Okay. Let's see. In your</p> <p>11 report -- they're in your report.</p> <p>12 BY MR. KLATT:</p> <p>13 Q And you might want to pull Cramer 2007</p> <p>14 while you're at it, because again my question is</p> <p>15 the same, it doesn't say anything at all about</p> <p>16 migration. It simply identifies particles already</p> <p>17 in tissue without saying how they got there.</p> <p>18 MS. PARFITT: Okay. Well, let's wait</p> <p>19 for a question and let's get the articles. Let's</p> <p>20 see. It would be tab -- it's a big binder.</p> <p>21 BY MR. KLATT:</p> <p>22 Q Can I -- can I --</p> <p>23 THE WITNESS: I have it in my office.</p> <p>24 BY MR. KLATT:</p> <p>25 Q Can I short-circuit this?</p>	<p>1 MS. PARFITT: Objection. Form.</p> <p>2 Make sure you've read the article.</p> <p>3 THE WITNESS: (Peruses document.) So</p> <p>4 I -- I've skimmed it quickly. I haven't read</p> <p>5 everything, but I don't see that it -- sorry, are</p> <p>6 we on?</p> <p>7 MS. PARFITT: Yes.</p> <p>8 THE VIDEOGRAPHER: We're on the record.</p> <p>9 THE WITNESS: I don't see that it</p> <p>10 directly addresses talc moving from the vagina</p> <p>11 into pelvic lymph nodes, but it certainly concerns</p> <p>12 the detection of talc in pelvic lymph nodes.</p> <p>13 BY MR. KLATT:</p> <p>14 Q But it says nothing in the article</p> <p>15 itself about establishing migration, correct?</p> <p>16 MS. PARFITT: Objection. Misstates his</p> <p>17 testimony.</p> <p>18 BY MR. KLATT:</p> <p>19 Q That you -- that you see.</p> <p>20 MS. PARFITT: Objection. Form,</p> <p>21 misstates his testimony.</p> <p>22 THE WITNESS: I -- I guess, you know --</p> <p>23 the question I would have is if it gets to the</p> <p>24 pelvic lymph nodes, it has to migrate there from</p> <p>25 somewhere. It's not deposited there deliberately.</p>
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<p>1 A Yes.</p> <p>2 Q I think this -- I can short-circuit</p> <p>3 this. If you just look at Cramer 2007. Do you</p> <p>4 have that handy?</p> <p>5 MS. PARFITT: Cramer 2007. Do you have</p> <p>6 it? I don't, Michael.</p> <p>7 THE WITNESS: It would be in my office.</p> <p>8 MR. KLATT: Could we go off for a second</p> <p>9 while you are looking?</p> <p>10 THE VIDEOGRAPHER: We're going off the</p> <p>11 record at 9:15 p.m.</p> <p>12 (Pause in the proceedings.)</p> <p>13 THE VIDEOGRAPHER: We are back on the</p> <p>14 record at 9:17 p.m.</p> <p>15 BY MR. KLATT:</p> <p>16 Q So, Dr. Siemiatycki, at my request,</p> <p>17 you've pulled the 2007 article, first author</p> <p>18 Cramer, called "Presence of talc in pelvic lymph</p> <p>19 nodes of a woman with ovarian cancer and long-term</p> <p>20 genital exposure to cosmetic talc," correct?</p> <p>21 A That's correct.</p> <p>22 Q And my question was simply, this -- this</p> <p>23 article says nothing about talc migrating. It</p> <p>24 simply observes that talc was found in a lymph</p> <p>25 node. Is that correct?</p>	<p>1 BY MR. KLATT:</p> <p>2 Q Well --</p> <p>3 A That was my interpretation of -- of</p> <p>4 this.</p> <p>5 Q Well, look at the very first page of</p> <p>6 this article, Cramer. You see at the very top</p> <p>7 under where the authors are listed?</p> <p>8 A Yes, I do.</p> <p>9 Q It says "Background"?</p> <p>10 A Yeah.</p> <p>11 Q "Although epidemiologic studies suggest</p> <p>12 talc use may increase ovarian cancer risk, there</p> <p>13 is no proof that talc used externally reaches the</p> <p>14 pelvis." Correct?</p> <p>15 MS. PARFITT: Objection. Form.</p> <p>16 BY MR. KLATT:</p> <p>17 Q That's what it says.</p> <p>18 A That's the background to this study.</p> <p>19 That's not --</p> <p>20 Q And it's 2007, correct?</p> <p>21 A Correct.</p> <p>22 Q Which is after the Henderson study that</p> <p>23 you cite. Correct?</p> <p>24 A Correct.</p> <p>25 Q And so after -- and what -- so we have</p>

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<p>1 Venter that you cited and Henderson, and what 2 else? 3 A Heller -- Heller? 4 Q What was the third? Heller, yes. Thank 5 you. 1995. And here is -- 6 MS. PARFITT: No, excuse me. 1996, I 7 believe. 8 BY MR. KLATT: 9 Q Excuse me, 1996. 10 And here in 2007, we have Dr. Cramer 11 saying that there's no proof that externally 12 applied talc reaches the ovaries, correct? 13 MS. PARFITT: Objection. Misstates the 14 science and the article and his testimony. Form. 15 BY MR. KLATT: 16 Q I'm just asking what the article -- what 17 Dr. Cramer and Dr. Godleski said in the Background 18 section to this article that you cite in 2007. 19 MS. PARFITT: Objection. Form. 20 THE WITNESS: You want me to comment on 21 whether their background -- the Background section 22 of this abstract contradicts the thesis that there 23 was evidence of migration before 2007? Is that 24 correct? 25 BY MR. KLATT:</p>	<p>1 proof. They haven't -- they didn't say there is 2 no evidence. They said, There is no proof. 3 BY MR. KLATT: 4 Q Do you understand -- my question, 5 Dr. Siemiatycki, was simply, did Dr. Cramer say 6 there was no proof? Correct? 7 MS. PARFITT: Objection. 8 THE WITNESS: He said there was no 9 proof. 10 MS. PARFITT: Asked and answered. 11 THE WITNESS: He didn't say there was no 12 evidence. 13 BY MR. KLATT: 14 Q Okay. Can you go back -- let's see, 15 let's go back to your expert report on biologic 16 plausibility. 17 MS. PARFITT: Right here. 18 BY MR. KLATT: 19 Q Oh, one other thing. When you were just 20 scanning Cramer 2007, I saw you were looking on 21 the page where he discussed the Heller paper. Did 22 you see that? 23 MS. PARFITT: Just give him a moment to 24 get that again. I think it was 17. 25 THE WITNESS: Sorry. No. 17?</p>
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<p>1 Q I'm -- my question is, you cited Venter 2 and Henderson and Heller for evidence of 3 migration, correct? 4 A Right. Right. 5 Q And those all predate well before 2007, 6 correct? 7 A Correct. 8 Q And here we have Dr. Cramer saying in 9 2007 there is no proof that talc used externally 10 reaches the pelvis, correct? 11 MS. PARFITT: Objection. Form, 12 misstates the article. 13 BY MR. KLATT: 14 Q Is that what he said? 15 A That's what it says. 16 Q And you -- 17 MS. PARFITT: Wait. Wait. Wait. Wait, 18 you let him finish. He said, That's what he said 19 -- finish, please. Thank you, Michael. 20 THE WITNESS: The -- the word "proof" in 21 that sentence is a red flag. I'm not sure what 22 they mean -- they meant by proof. They might 23 have -- well have said, There is evidence that, 24 but it is not yet conclusive. That is one 25 interpretation of a sentence like, There is no</p>	<p>1 MS. PARFITT: Yeah. 2 THE WITNESS: You have very good eyes if 3 you saw me looking at the Heller. I actually 4 wasn't, but -- 5 BY MR. KLATT: 6 Q I thought you were on that page. 7 A Well, I was -- I scanned each of the 8 four pages. There aren't that many pages. The -- 9 I see mention of the Heller article. 10 Q On page 500? 11 A Yes, I do see that. 12 Q Do you see where Dr. Cramer in 2007 is 13 suggesting that the explanation for the Heller 14 study may be contamination that was introduced 15 during the processing of the tissue specimens? 16 A So I see that he says it might have been 17 introduced during processing, and it's a potential 18 weakness. He doesn't affirm that it is. He says 19 it might be. 20 Q So contamination is another explanation 21 potentially for why you might find talc in ovarian 22 or gynecologic tissues? 23 MS. PARFITT: Objection. Form. 24 THE WITNESS: I -- I guess so. Not 25 being an expert in pathology and physiology, I --</p>

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<p>1 that seems like a plausible -- seems to me like a</p> <p>2 plausible alternative explanation.</p> <p>3 BY MR. KLATT:</p> <p>4 Q You go on and comment in the next</p> <p>5 paragraph of your biologic plausibility on two</p> <p>6 trace heavy metals, chromium and nickel compounds,</p> <p>7 correct?</p> <p>8 A So where are we -- oh, yeah. Yes.</p> <p>9 Q You're aware that IARC has made</p> <p>10 determinations regarding chromium and nickel</p> <p>11 compounds, correct?</p> <p>12 A Yes, correct.</p> <p>13 Q And neither one of the determinations</p> <p>14 found they were linked to ovarian cancer at all,</p> <p>15 correct?</p> <p>16 A That's correct.</p> <p>17 Q They found they were related to nasal,</p> <p>18 sinus and lung cancers in people, primarily</p> <p>19 workers, who had breathed the fumes, correct?</p> <p>20 A That's correct.</p> <p>21 Q So that's no way analogous to any trace</p> <p>22 heavy metals in talc, correct?</p> <p>23 MS. PARFITT: Objection. Form.</p> <p>24 THE WITNESS: It's -- it's not directly</p> <p>25 relevant. It may be indirectly relevant. The</p>	<p>1 THE VIDEOGRAPHER: This ends -- this</p> <p>2 ends the deposition of Jack Siemiatycki.</p> <p>3 We are going off the record at 9:28 p.m.</p> <p>4 (Whereupon, the deposition</p> <p>5 of JACK SIEMIATYCKI, Ph.D. was</p> <p>6 concluded at 9:28 p.m.)</p> <p>7</p> <p>8</p> <p>9</p> <p>10</p> <p>11</p> <p>12</p> <p>13</p> <p>14</p> <p>15</p> <p>16</p> <p>17</p> <p>18</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p>
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<p>1 evidence that allowed IARC to make determinations</p> <p>2 about lung cancer risks is evidence from</p> <p>3 industrial cohorts of males.</p> <p>4 And so there has never been an</p> <p>5 evaluation of ovarian cancer risks in relation to</p> <p>6 exposed women to chromium and nickel. It's terra</p> <p>7 incognita basically.</p> <p>8 BY MR. KLATT:</p> <p>9 Q And so following up on that, you're not</p> <p>10 aware of any evidence at all that women who have</p> <p>11 used externally applied talcum powder to the</p> <p>12 genital area have higher blood or tissue levels of</p> <p>13 chromium or nickel compounds than women who've</p> <p>14 never ever used talc at all, correct?</p> <p>15 MS. PARFITT: Objection. Form.</p> <p>16 THE WITNESS: I've -- I'm not aware of</p> <p>17 any evidence.</p> <p>18 MR. KLATT: I think that's all the</p> <p>19 questions I have.</p> <p>20 MS. PARFITT: I have no further</p> <p>21 questions.</p> <p>22 Dr. Siemiatycki, you are done. We will</p> <p>23 read and sign.</p> <p>24 Thank you, Leslie.</p> <p>25 Thank you all.</p>	<p>1 CERTIFICATE OF CERTIFIED SHORTHAND REPORTER</p> <p>2 The undersigned Certified Shorthand Reporter</p> <p>3 does hereby certify:</p> <p>4 That the foregoing proceeding was taken before</p> <p>5 me at the time and place therein set forth, at</p> <p>6 which time the witness was duly sworn; That the</p> <p>7 testimony of the witness and all objections made</p> <p>8 at the time of the examination were recorded</p> <p>9 stenographically by me and were thereafter</p> <p>10 transcribed, said transcript being a true and</p> <p>11 correct copy of my shorthand notes thereof; That</p> <p>12 the dismantling of the original transcript will</p> <p>13 void the reporter's certificate.</p> <p>14 In witness thereof, I have subscribed my name</p> <p>15 this date: February 4, 2019.</p> <p>16</p> <p>17</p> <p>18 _____</p> <p>19 LESLIE A. TODD, CSR, RPR</p> <p>20 Certificate No. 5129</p> <p>21 (The foregoing certification of</p> <p>22 this transcript does not apply to any</p> <p>23 reproduction of the same by any means,</p> <p>24 unless under the direct control and/or</p> <p>25 supervision of the certifying reporter.)</p>

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Jack Siemiatycki, Ph.D.

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<p>1 INSTRUCTIONS TO WITNESS</p> <p>2 Please read your deposition over carefully and</p> <p>3 make any necessary corrections. You should state</p> <p>4 the reason in the appropriate space on the errata</p> <p>5 sheet for any corrections that are made.</p> <p>6 After doing so, please sign the errata sheet</p> <p>7 and date it.</p> <p>8 You are signing same subject to the changes</p> <p>9 you have noted on the errata sheet, which will be</p> <p>10 attached to your deposition. It is imperative</p> <p>11 that you return the original errata sheet to the</p> <p>12 deposing attorney within thirty (30) days of</p> <p>13 receipt of the deposition transcript by you. If</p> <p>14 you fail to do so, the deposition transcript may</p> <p>15 be deemed to be accurate and may be used in court.</p> <p>16</p> <p>17</p> <p>18</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p>	<p>1 ACKNOWLEDGMENT OF DEPONENT</p> <p>2 I, _____, do hereby</p> <p>3 certify that I have read the foregoing pages, and</p> <p>4 that the same is a correct transcription of the</p> <p>5 answers given by me to the questions therein</p> <p>6 propounded, except for the corrections or changes</p> <p>7 in form or substance, if any, noted in the</p> <p>8 attached Errata Sheet.</p> <p>9</p> <p>10 _____</p> <p>11 JACK SIEMIATYCKI, Ph.D. DATE</p> <p>12</p> <p>13</p> <p>14 Subscribed and sworn to</p> <p>15 before me this</p> <p>16 _____ day of _____, 20____.</p> <p>17 My commission expires: _____</p> <p>18 _____</p> <p>19 Notary Public</p> <p>20</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p>
<p>Page 355</p> <p>1 -----</p> <p>2 E R R A T A</p> <p>3 -----</p> <p>4 PAGE LINE CHANGE</p> <p>5 _____</p> <p>6 REASON: _____</p> <p>7 _____</p> <p>8 REASON: _____</p> <p>9 _____</p> <p>10 REASON: _____</p> <p>11 _____</p> <p>12 REASON: _____</p> <p>13 _____</p> <p>14 REASON: _____</p> <p>15 _____</p> <p>16 REASON: _____</p> <p>17 _____</p> <p>18 REASON: _____</p> <p>19 _____</p> <p>20 REASON: _____</p> <p>21 _____</p> <p>22 REASON: _____</p> <p>23 _____</p> <p>24 REASON: _____</p> <p>25</p>	

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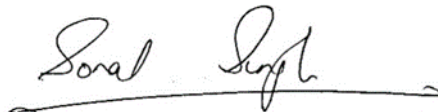
**UNITED STATES DISTRICT COURT
DISTRICT OF NEW JERSEY**

**IN RE JOHNSON & JOHNSON
TALCUM POWDER PRODUCTS
MARKETING, SALES PRACTICES,
AND PRODUCTS LIABILITY
LITIGATION**

MDL NO. 16-2738 (FLW) (LHG)

THIS DOCUMENT RELATES TO ALL CASES

**RULE 26 EXPERT REPORT OF
SONAL SINGH, MD, MPH**

A handwritten signature in cursive script, reading "Sonal Singh", followed by a horizontal line extending to the right.

Date: November 16, 2018

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**TALCUM POWDER PRODUCTS AND RISK OF OVARIAN CANCER
EXPERT REPORT**

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Nov 16, 2018

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I. INTRODUCTION AND SUMMARY.

I have been retained to review scientific evidence and analyze the epidemiological data and, based on these data and other relevant evidence, to provide my professional opinion about whether talcum powder products are causally related to ovarian cancer. I have used a weight of evidence approach in examining the causal relationship between talcum powder products and ovarian cancer. I have relied upon my own systematic review of the literature and the cumulative body of evidence as the basis upon which I provide my opinions. This included gathering all relevant data based on *in vitro*, animal, and human epidemiologic studies on this topic. Although the weight of my opinions is derived from findings published in the peer-reviewed literature, relevant unpublished documents are also noted when applicable. The individual studies were examined for both reliability and validity noting their strengths and limitations. The cumulative body of evidence was then synthesized and examined and weighed using a widely accepted organizing framework- the Bradford Hill approach. (1). Using these materials, my education, and my prior clinical and research experiences, I have employed the methods generally accepted by the scientific community that would be used to develop a peer-reviewed manuscript.

In summary, it is my opinion, to a reasonable degree of scientific and medical certainty, that talcum powder products, specifically here Johnson's Baby Powder and Shower to Shower, can cause ovarian cancer. This finding is based on the totality of the medical and scientific evidence from meta-analysis, and consistent findings of a statistically significantly increased risk in observational studies, evidence of retrograde migration and inhalation of talc, presence of known or suspected carcinogens in Talcum Powder Products, and inflammatory tissue response that initiates multiple pathways and biological mechanisms by which talcum powder products can cause ovarian cancer. While these factors carry the most weight in my assessment, available data on the biological gradient of Talc exposure and ovarian cancer (dose response) also support my opinion.

II. BACKGROUND AND QUALIFICATIONS.

I am an Associate Professor in the Department of Family Medicine and Community Health and the Meyers Primary Care Institute, with a joint appointment in the Department of Quantitative Health Sciences at the University of Massachusetts Medical School, Massachusetts. I received

my M.B.B.S. (equivalent to M.D.) in 1998 from Patna Medical College, India. I then completed my internal medicine internship and residency in the Department of Medicine at the Unity Health Center, affiliated with the University of Rochester School of Medicine in 2005. Subsequently, I served on the Faculty as an Instructor of Medicine at Wake Forest University until 2007, and then as an Assistant Professor of Medicine in 2007. I received a joint appointment as an Assistant Professor of Epidemiology at Wake Forest University in 2008. While on the faculty at Wake Forest University, I obtained my master's in public health at Johns Hopkins University in 2008. I was an Assistant Professor in the School of Medicine at Johns Hopkins University as a recipient of the NIH Johns Hopkins Clinical Research Scholars Award in 2009. I held joint appointments in the Department of International Health and Health Policy and Managements and served as the Associate Director at the Center for Drug Safety and Effectiveness at Johns Hopkins University until 2016.

In my current position, I devote most of my professional time to epidemiologic research. I conduct clinical research with a focus on drug safety, evidence synthesis, and shared decision making. The major focus of my research is understanding the adverse effects of pharmacologic therapies. The remainder of my professional effort is dedicated to practicing general medicine and teaching activities. I have taught courses in systematic reviews, clinical epidemiology, pharmacoepidemiology, and the practice of internal medicine to medical students, interns, residents, and public health students at Johns Hopkins University and Wake Forest University. I have taught courses in clinical epidemiology and pharmacoepidemiology to researchers in the Bloomberg School of Public Health at Johns Hopkins University

I have served as an advisor to the World Bank, WHO International Agency for Research on Cancer and various pharmaceutical firms. I was part of World Health Organization International Agency for Research (WHO-IARC) panel which evaluated the carcinogenicity of various drugs and herbal products. (2). I currently serve as a member of the American College of Chest Physicians Guideline Panel. I have also been part of a panel that developed the PRISMA-HARMS (Preferred Item for Reporting Harm in Systematic Reviews and Meta-Analyses) checklist with an aim to improve the reporting of systematic reviews and meta-analysis of adverse effects. (3). My research has been funded by the Food and Drug Administration, the Agency for Health Care Research and Quality, the National Institute of Health and the Patient Centered Outcomes Research Institute. I am a recipient of numerous awards including the prestigious Johns Hopkins Clinical Research Scholars Award from the

National Institute of Health and the Tinsley R. Harrison Master Teachers Award at Wake Forest University School of Medicine. My systematic review on varenicline and the risk of cardiovascular events published in the prestigious Canadian Medical Association Journal was awarded the Best Research Paper of the year among hundreds of articles submitted to the Journal. I also serve as a peer reviewer for more than 50 journals and serve on the editorial board of prominent journals such as *BMJ Evidence Based Medicine*. I have reviewed grants for numerous federal and international organizations. I have conducted several epidemiological studies and systematic reviews and meta-analysis featured in prominent medical journals such as the *Journal of the American Medical Association* and the *British Medical Journal*. I have authored or co-authored more than 100 original peer-reviewed scientific articles and my work has been cited more than 13,000 times and my h-index is 48 [h number of papers which has been cited by others at least h times]. My work has been featured in *Science*, *Journal of the American Medical Association*, *British Medical Journal*, and the *Lancet*, as well as media outlets such as the *NYTIMES*, *Wall Street Journal* and *Washington Post*.

This background provides expertise in the use of epidemiological research methods in diverse settings, and in the clinical practice of medicine, both relevant to the present scenario. I have charged a rate of \$600.00 per hour in the preparation of this report. Attached as Exhibit A is a copy of my curriculum vitae.

III. PUBLICATIONS.

Below is a representative sampling of those articles published in leading medical journals such as *Journal of American Medical Association*, *Journal of American Medical Association-Internal Medicine*, and *British Medical Journal*. Please refer to my attached curriculum vitae for a complete listing of all publications.

- Singh S, Loke YK, Furberg CD. Long-term risk of cardiovascular events with rosiglitazone- A systematic review and meta-analysis. *Journal of the American Medical Association* 2007; 298: 1189-1195.
- Singh S, Loke YK. Furberg CD. Inhaled anticholinergics and the risk of major adverse cardiovascular events in Patients with Chronic Obstructive Pulmonary Disease: A systematic Review and Meta-analysis. *Journal of the American Medical Association* 2008; 300: 1439-1450. (CME Article in JAMA).

- Mills EJ, Wu P, Chong G, Ghement I, Singh S, et al. Efficacy and safety of statin treatment for cardiovascular disease: a network meta-analysis of 170 255 patients from 76 randomized trials. *Q J Med* 2011; 104: 109-24.
- Singh S, Loke YK, Enright P, Furberg CD. Mortality Associated with Tiotropium Respimat® in Patients with Chronic Obstructive Pulmonary Disease- A Systematic Review and Meta-Analysis of Randomized Controlled Trials. *British Medical Journal* 2011; 342: d3215.
- Singh S, Loke YK, Spangler JG, Furberg CD. Risk of serious adverse cardiovascular events with Varenicline: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. *Canadian Medical Association Journal* 2011; 183:1359-66. (with an editorial by JT Hays. Varenicline for smoking cessation. Is it a heart breaker?)- Best Research paper of the year award.
- Singh S, Loke YK. Drug Safety Assessment in Clinical Trials: Methodologic Challenges and Opportunities. *Trials* 2012, 13: 138.
- Singh S, Chang HY, Richards TM, Weiner JP, Clark JM, Segal JB. Glucagonlike Peptide 1-Based Therapies and Risk of Hospitalization for Acute Pancreatitis in Type 2 Ovarian cancer Mellitus: A Population-Based Matched Case-Control Study. *Journal of the American Medical Association Intern Med.* 2013 25:1-6.
- Grosse Y, Loomis D, Lauby-Secretan B, El Ghissassi F, Bouvard V, Benbrahim-Tallaa L, Guha N, Baan R, Mattock H, Straif K; International Agency for Research on Cancer Monograph Working Group. Collaborators: Stewart BW, Biggar RJ, Lachenmeier DW, Singh S, Tsuda H, Baguley B, Marques MM, Tseng CH, Knight TL, Beland FA, Betz JM, Carcache de Blanco EJ, Cunningham ML, Dunnick JK, Guo L, Jameson CW, Karagas M, Lunn RM, McCormick DL, Witt KL, Zhou S. Carcinogenicity of some drugs and herbal products. *Lancet Oncol.* 2013; 14(9):807-8.
- Zorzela, L., Loke, Y.K., Ioannidis, J.P., Golder, S., Santaguida, P., Altman, D.G., Moher, D., Vohra, S., Boon, H., Clark, J., Derry, S., Gallivan, J., Gardiner, P., Gøtzsche, P., Loder, E., Napoli, M., Pilkington, K., Shekelle, P., Singh S, Witt, C., Lasserson, T., Wu, T., Shamseer, L., Mulrow, C. PRISMA harms checklist: improving harms reporting in systematic reviews. *British Medical Journal* 2016;352: i157.
- Onasanya O, Iyer G, Lucas E, Lin D, Singh S, Alexander GC. Association between exogenous testosterone and cardiovascular events: an overview of systematic reviews. *Lancet Diabetes Endocrinol.* 2016 Nov;4(11):943-956.
- Alexander GC, Iyer G, Lucas E, Lin D, Singh S. Cardiovascular risks of exogenous testosterone among men. *Am J Med.* 2017 Dec;130(12):1449-1457.

IV. STUDY DESIGN CONSIDERATIONS.

I will examine the strengths and weaknesses of the study designs that are relevant to the present scenario. Each of the study-types discussed below has its advantages and disadvantages. Every study is subject to biases and error; none is appropriate and feasible for every situation. Instead, the evidentiary value of each study must be assessed and weighed on an individual basis, and in the context of the totality of the body of literature or scientific studies.

IV.I Randomized controlled trials. In double blind randomized controlled trials (RCTs) both the investigator and the participant are blinded to treatment assignment. All characteristics whether known or unknown, are evenly distributed at random between the intervention and placebo arm. Thus, if there are differences in incidence of outcome, it can be inferred to be a consequence of the exposure itself (i.e. causative).

However, the prospective nature of RCTs also results in several significant drawbacks for effects that are rare and/or slow to develop, like ovarian cancer. In addition to the ethical difficulties of administering a substance that may be harmful, such as talcum powder products, it is difficult prospectively to ensure study-subject compliance over the decade-plus timeframes required to assess ovarian cancer risk, and obviously impractical to have researchers administer a daily perineal talc application to study subjects. Similarly, there is no mechanism by which to randomly assign participants for non-modifiable exposures or the event may be sufficiently rare, such as in the present case of ovarian cancer to be evaluated in a randomized trial. The definitive randomized controlled trial in which patients would be randomized to talcum powder products and/or placebo and measure the outcome of ovarian cancer would be ideal. However, such a randomized trial does not exist, and such a randomized trial would be unethical.¹ Then again, randomized clinical trials are not necessary to establish causal evidence of harm. For instance, there is no randomized trial which supports the causal role of smoking in lung cancer. As a result, to address this question, we must rely on other study designs including observational studies and their meta-analysis to draw inferences on causation. The preponderance of evidence we have on harms of products are derived from such epidemiological studies.

¹ Defendants here have admitted this fact. Deposition of Linda Loretz 562:14-563:6 (October 1, 2018) (4); Deposition of Joshua Muscat 408:21-410:20 (September 25, 2018) (5).

IV.II Systematic reviews and Meta-analysis. A systematic review and meta-analysis is a study design wherein systematic searches are carried out to identify studies reporting on a question of interest. Systematic reviews provide a high level of evidence when evaluating the effect of interventions. (6).

The meta-analytic point estimate represents the sum of evidence from all the included studies. When individual studies may be underpowered to detect an effect, meta-analysis of cumulative studies may allow one to distinguish whether the entire body of evidence supports the presence or argues against evidence of a causal association. Apart from the P-value as a measure of statistical significance, the confidence intervals are used to assess the statistical variability around the estimate. In a meta-analysis the studies are weighted by the sample size of included studies with larger studies contributing more weight to the final estimate. Studies are examined to determine whether the findings are clinically and statistically homogenous or heterogenous. Clinical heterogeneity includes any differences in populations and interventions. It is also important to evaluate statistical heterogeneity among studies included in the meta-analysis. (7). Although some amount of variation in individual estimates of treatment effect is expected by chance, the excess of variation which cannot be explained by chance alone is referred to as statistical heterogeneity. I^2 is used as a measure of *statistical heterogeneity*—a percent of variation due to heterogeneity compared to chance, the higher the value the more the proportion of statistical heterogeneity.

The different approaches to modelling data across studies may yield slightly different results. Fixed effects meta-analysis which assumes that all the studies are measuring the same effect yield tighter confidence intervals, whereas random effects meta-analysis which assume that studies are measuring different effects in the population yield more conservative effects. Random-effects models may be more appropriate when the amount of statistical heterogeneity is high. Some amount of heterogeneity is expected when the database includes observational studies.

However, it must be noted that while meta-analysis can overcome issues of limited statistical power and provide information on consistency or inconsistency of effects, one needs to carefully examine the individual studies for their limitations and susceptibility to bias and confounding.

Thus, for example, if a study is too short to detect the effect in question, then even a patient-level pooled analysis of several such studies will very likely fail to detect a true causal relationship, even when one exists. This is an illustration of why it is important to consider study design, bias, and confounding in weighing the results from both individual studies and their meta-analysis. Systematic reviews are also susceptible to various publication and funding biases which need to be considered in interpreting results.

Meta-regression in using summary or group level published data may be susceptible to ecological or group level biases and result in spurious conclusions. (8). As a result, it is not recommended to evaluate the association between treatment effect, such as the difference in the risk of ovarian cancer, and participant characteristics at the study level (e.g., mean age of all participants) using aggregate level data, (9) as these may be susceptible to group level or ecological biases. An individual participant pooled analysis in which investigators have access to the patient-level data, such as that by Terry et al. discussed below, (10) is considered of higher quality than meta-analysis of summary data and provides the ability to reliably assess the effect of other patient and outcome related variables.

Umbrella reviews and overviews of systematic reviews. An umbrella review systematically collects and reviews evidence from multiple systematic reviews and meta-analysis and allows integration of evidence from multiple systematic reviews and meta-analysis, (11) to offer a much broader view of the evidence landscape. Individual systematic reviews and/or meta-analysis included in an umbrella review or overview should be critically appraised for quality. The 11-item critical appraisal tool AMSTAR (Assessing the Methodological Quality of Systematic Reviews) is a reliable and valid tool which provides an assessment of the quality of included systematic reviews and meta-analysis in an overview. (12).

What is the precise causal question or the hypothesis being tested? One cannot interpret the scientific evidence without being precise about the causal question that is being addressed when evaluating the association between any exposure and an outcome in any epidemiologic study. An exclusively narrowly framed hypothesis (e.g., evaluating only one route of exposure such as using talcum powder on contraceptive diaphragm), (13) while disregarding other important and relevant routes and mechanisms of exposure, is inherently limited by design. Since we may not have a complete picture of the underlying mechanisms or the timings of risk of products at the

time of study design, it is even more critical that studies on safety evaluate all potential routes of exposure.

IV.III. Cohort and Case-Control Studies. There are several considerations in interpreting data from prospective or retrospective observational studies or case-control studies. However, it is important to consider issues of study design, random error, systematic error, bias, and confounding in the interpretation of data. Random errors are statistical fluctuations in the measured data due to the limitations of the measurement instrument. They may occur in both direction because of the inability to measure exposure and outcomes in precisely the same manner. There is also the possibility of measurement error in the measurement of outcome and exposure in both study designs. If the measurement error is non-differential, such misclassification of exposure or outcomes usually biases findings towards the null. Systematic errors, by contrast, are reproducible inaccuracies that are consistently in the same direction, often due to a problem which persists throughout the entire study and are difficult to correct.

Case-control studies involve subjects diagnosed with the disease at issue, such as ovarian cancer (the “cases”), and a suitable number of subjects without the disease (the “controls”). Exposure is ascertained retrospectively among both cases and controls. The results are then analyzed to see if there is an association between the exposure and the disease. In contrast, prospective cohort studies are study designs in which subjects with and without the exposure of interest are recruited and followed up in time for the development of outcomes. This study design establishes temporality wherein the exposure precedes the outcome. It is important to determine the latency and induction between the exposure and the disease to assess the duration of follow-up. As an example, a 12-month follow-up study to evaluate the association between exposure to smoking and lung cancer would be unlikely to demonstrate an increase in the risk of lung cancer.

There are several strengths to the case-control design including the ability to ascertain long-term exposure-outcome relationships, particularly important to the present scenario because ovarian cancer develops over many years. Once cases and controls have been established, one can evaluate the association between multiple exposures and outcomes. In contrast, prospective cohort studies may be limited by the short-duration of follow-up which may be insufficient to ascertain the effect of exposure on long-term outcomes and bias their findings towards the null. Secondly, for relatively rare diseases, such as ovarian cancer, case-control studies are more

efficient. Because we are looking at the incidence of disease between the two arms of a study, a cohort study may have limited statistical power regardless of the actual number of subjects enrolled if the number of cases is small. For example, the Nurses' Health Study recruited almost 80,000 participants for only 307 cases of ovarian cancer. (14).

Both study designs are susceptible to selection bias when the selection of the participants into the study (or their likelihood of being retained in a cohort study) leads to a result that is different from the result had we enrolled the entire target population. In other words, the exposure-outcome relationship in controls or cases may be different from the target population. This can arise due to selection of controls not representative of the target population, non-response that is related to exposure and outcome, or differential loss to follow-up in a cohort study related to exposure and outcome status. Selection bias can bias findings either away from the null or towards the null.

Case-control studies, by their design, are generally not blinded and are also susceptible to bias as a result. They are also susceptible to recall bias, i.e. the concern that subjects with the disease may be more diligent in recollecting past uses. However, the degree of recall bias will depend on the type of exposure with chronic daily long-term exposures, such as talcum powder product use, being less likely to be subject to recall bias than intermittent short-term exposures. In contrast, prospective cohort studies in which subjects are recruited and then followed up for the development of outcomes are less susceptible to recall bias.

In addition, there is the issue of what may be called "behavior change" bias in cohort studies which may also bias their findings towards the null if exposure is only ascertained at baseline and not updated during follow up. This bias towards the null reduces the apparent effect of the exposure on the outcome. For example, if the subjects accurately report their talcum powder product use (or lack there-of) at baseline, but there is no follow-up, then the "ever" users' status will still be correct at the end of the study, because once having used talc, their "ever" status cannot change. This will not be true, however, of the "never" users; if they subsequently use talc, then without follow-up, their status will still be incorrectly recorded as "never." If there is a true causal connection, some ovarian cancers caused in the "never" category will, in fact, belong in the "ever" category, potentially biasing the study towards the null. Cohort studies are also susceptible to attrition bias and efforts should be used to minimize loss to follow-up. The main strengths of cohort studies are that if an effect (after adjusting for other confounding

factors) is found despite these biases towards the null, then it is more likely to be a causal relationship; the limitations being that they are less sensitive to determining a causal relationship. Case-control studies are based on past behavior and are not affected by this bias. Cohort studies are also susceptible to several prevalent user biases including potential bias due depletion of susceptibles. (15). A cohort study evaluating the association between talc use and ovarian cancer which limits the analysis to prevalent users (rather than new users), may largely be composed of survivors of the early effect of talc exposure on ovarian cancer, since new users who developed ovarian cancer after talc exposure may be ineligible for inclusion. This will potentially bias the estimates towards the null.

One important distinction to note is between risk factors for the disease and confounders. (16). A risk factor is an exposure which may explain the development or cause of disease in the population. These could be potentially modifiable or non-modifiable risk factors such as genetic risk factors. Confounding represents a special case of bias that results when the relationship between the risk factor -disease relationship is altered. A variable is considered a confounder only when ALL three criteria are present: a) the confounder is associated with the exposure in the population; b) the variable is related to the disease in the population; and c) the variable is not a link in the causal pathway to the disease. Risk factors that do not meet all the above criterion are not considered confounders of the exposure-outcome relationships (and thus may not require adjustment in the analysis).

Observational studies may also be susceptible to unmeasured confounding. Importantly, the potential for confounding does not mean that such a confounding exists. To address bias, confounders of the disease-outcome relationship need to be adjusted for in the analysis of epidemiologic studies. The methods for adjustment for known confounders include regression or propensity score methods. In establishing the effect of any exposure on an outcome it is important to disentangle the direct effect of an exposure of an outcome vs the indirect effect because of some mediators. The strength of association, in and of itself, does not denote whether a risk factor causes the disease. It is reflective of the background rate of the disease in the population and the relative risk of other competing risk factors. When the strength of association is weak, restricting the disease to a low risk population with low background rates of the diseases will magnify the association due to lack of competition among risk factors. (16)

One must be careful in interpreting data from subgroup analysis, such as analysis of various dose categories or age or ethnic groups, such as the case here with pre-menopausal women vs post-menopausal women or subgroup of women stratified by age, sex and ethnicity. The results of tests of interaction are important in interpreting data from such studies. If the test of interaction is not significant, this suggests that there is a lack of significant difference between the two groups. However, such subgroup tests can be underpowered because of reduction in sample size. Additionally, while a study may be internally valid it may not be generalizable to participants in the overall population beyond those included in the study. As an example, the cohort study of post-menopausal women reporting a non-significantly increased risk of ovarian cancer with genital talc use may not be generalizable to premenopausal women. (17). Despite the limitations noted above, most of our knowledge of the adverse effects of therapies has been derived from observational studies, since randomized controlled trials are not practical for several agents and rare outcomes.

It is also important to draw attention to the proper interpretation of P-values, confidence intervals and statistical significance. (18). I have followed the general principles laid out by the American Statistical Association on the interpretation of P-values and statistical significance. P-value can only indicate how incompatible data are with a statistical model. P-values do not indicate the probability that the studied hypothesis is true or the probability that data were produced by random chance alone. A P-value does not measure the size of an effect or the importance of a result and undue reliance should not be placed on whether a P-value passes a specific threshold. Full reporting and transparency are needed for interpretation of results. Confidence intervals (CI) measure statistical significance, (19) and indicate the precision and degree of uncertainty associated with a sample statistic. A 95% CI means that if we used the same sampling method to select different samples and computed an interval estimate for each sample, we would expect the true population parameter to fall within the interval estimates 95% of the time. CIs that remain elevated above 1 for relative risks (RRs) or odds ratios (ORs) are considered statistically significant. A narrow CI indicates a relatively higher level of precision. Non-overlapping CIs across two studies suggest a statistically significant difference between the study findings, whereas overlapping CIs may suggest consistent results. Thus, it is not necessary, and it is highly unlikely to have identical point estimates across studies to establish the presence of a consistent exposure-outcome association.

V. EPIDEMIOLOGY AND PATHOGENESIS OF OVARIAN CANCER.

Ovarian cancer is the most lethal gynecologic cancer in women. It is the leading cause of cancer death among gynecologic cancer in the US and the fifth most common cause of cancer with more than 14,000 deaths per year. The incidence is 11.4 cases per 100,000 women per year, with a mortality rate of 7.4 deaths per 100,000 women. (20). Approximately 1.3 percent of women will be diagnosed with ovarian cancer at some point during their lifetime. Approximately 22,400 new cases of ovarian cancer would be diagnosed in the US in 2017 with 14,080 deaths. (21).

Most women are diagnosed at an advanced stage of the disease and it is usually asymptomatic but may present as abdominal distention, bloating, and in a minority of cases vaginal bleeding. The prognosis is relatively poor when it presents at the advance stage where therapeutic options including chemotherapy offer little benefit. As discussed in more detail in Section X below, inflammation is known to play an important role in the pathogenesis of ovarian epithelial cancer through a mechanism of cell proliferation, oxidative stress DNA damage and gene mutations.

VI. WHAT CONSTITUTES COSMETIC TALCUM POWDER PRODUCTS?

- While I will examine the evidence of talcum powder products and their causal association with ovarian cancer, ascertaining what constitutes “talcum powder” it is important to emphasize that Talcum powder cosmetic products are not “pure talc.” The evidence I reviewed demonstrates talcum powder products contain asbestos, fibrous talc, heavy metals such as cobalt, chromium, nickel, and various fragrance chemicals (22)(23). This report evaluates the risk of ovarian cancer associated with talcum powder products and its constituents. When I refer to talc or talcum powder products in this report, I am referring to commercially available talcum powder products and all constituent elements contained within.

- Talc is a naturally occurring mineral and its chemical composition is hydrous magnesium silicate with a chemical formula of $\text{Mg}_3\text{Si}_4\text{O}_{10}(\text{OH})_2$. In its natural form, talc may contain asbestos, also a naturally occurring silicate mineral, with a different crystal structure. Both talc and asbestos belong to the family of silicates that may occur in fibrous form, which is known to cause cancer. The structure of talc is characterized by a hexagonal sheet arrangement of silicon oxygen tetrahedral groups in a common plane. This results in a double-sheeted structure where the sheets are held together by weak van der Waals bonds. Talc consists mostly of these plate-

like structures ("platy talc") but talc can occur in fibrous form. Talc fibers are like asbestos fibers in size and shape. (22, 24).

- Despite claims that talcum powder products manufactured after the mid-1970s were "asbestos free," published articles, internal company documents, and testing of historical samples I reviewed demonstrate that talcum powder products can contain asbestos and other carcinogenic constituents as discussed below. For example, talc powders from national and international markets were analyzed by Paoletti et al. in a 1983 study to assess fiber content. (25). Samples of talc powders demonstrated fiber contents up to 30% of total particles. About half of the talc powders revealed the presence of asbestos. In some samples, a very high level of asbestos was revealed. (25). Consistently, the 1991 Blount study also found asbestos in cosmetic talcum powder. (26). In a recent deposition, the author of the 1991 study testified she had detected specifically in Johnsons and Johnsons baby powder. (27).

- Although the FDA conducted a survey of talc manufacturers in 2009-2010 and found no asbestos fibers or structures in any of the samples of cosmetic-grade raw material talc or cosmetic products containing talc, (28) the results were limited; only four out of nine talc suppliers submitted samples, and the number of products tested was low. The failure to detect asbestos could either be due to the technique used or the use of a non-representative sample. The FDA itself noted the study could not "prove that most or all talc or talc-containing cosmetic grade products currently marketed in the United States are likely to be free of asbestos contamination." (29).

- I reviewed Longo et al.'s report from August 2017 where he tested 30 bottles of Johnson's Baby Powder. (30). They found 17 samples contained detectable amounts of asbestos. They also found half of the samples contained fibrous talc. I also reviewed two additional reports from Dr. Longo where he found fibrous talc and asbestos in Johnson's Baby Powder. (31, 32). I reviewed the depositions and exhibits of Dr. John Hopkins, corporate representative for Johnson and Johnson, who testified to numerous positive tests for asbestos and fibrous talc. (33).

- In a recent report, Longo et al. (34) estimates that 37 out of 56 random samples (66%) of bottles of talcum powder products tested contain asbestos, which indicates that approximately 2 out of 3 bottles of talcum powder containing products are contaminated with asbestos. Talcum powder products are generally used by women habitually for months or years, rather than a

single application or a single bottle of use. Each successive use of a bottle of talcum powder product by an individual further accentuates the cumulative probability of their exposure to asbestos, beyond the probability conferred by the use of a single bottle. I reserve the right to supplement my report in order to estimate this probability of exposure to asbestos through habitual use of talcum powder products contaminated with asbestos, once the analysis of additional samples of talc is complete. Longo et al. also estimates that 41 of 42 random samples of bottles of talcum powder products tested contain fibrous talc. I reserve the right to supplement my report in order to estimate this probability of exposure to fibrous talc through habitual use of talcum powder products contaminated with fibrous talc, once the analysis of additional samples of talc is complete.

- I also reviewed the deposition and exhibits of Julie Pier, corporate representative for Imerys Talc America, Inc., who testified to numerous positive tests for asbestos and heavy metals between 1985 and 2002. (35).
- My review of monographs published by the International Agency for Research on Cancer (IARC) show that asbestos is a well-established carcinogen and unequivocally known to cause several cancers including mesothelioma of the lung, larynx, and ovarian cancer. (36). Overall, the International Agency for Research on Cancer Working Group classified asbestos compounds as “carcinogenic to humans” (Group 1) in 2012. (36, 37). IARC has also concluded that talc including asbestiform fibers grown in an asbestiform habit - commonly termed “fibrous talc” - is “carcinogenic to humans” (Group 1). (38).
- I also reviewed documents demonstrating talcum powder products may contain heavy metals such as chromium, nickel, and cobalt. (22). Asbestos, chromium, and nickel were all classified as a Group 1 carcinogens by IARC. (36) Cobalt is also present in talcum powder products and classified by IARC as a Group 2B carcinogen.

VII. SUMMARY OF OPINIONS.

1. **Statistical Significance.** There is a statistically significant increased risk of ovarian cancer with talcum powder products as demonstrated by most meta-analyses to date. (10, 39-42). Although a flawed analysis conducted limited to the use of talc dusted diaphragms and ovarian cancer conducted on behalf of the manufacturer reported an excess risk which was not

statistically significant, (13) it had several data extraction errors and was of lower methodological quality. (43). Several independent meta-analysis by academic researchers, some of which include individual participant data, (10) and the most recent meta-analysis reported a statistically significantly increased risk of ovarian cancer associated with perineal talc use, (42) rendering the previous findings of Huncharek et al obsolete. The studies of the highest rated methodologic quality as shown in **Table 1** which provides a methodologic grading of the quality of the included systematic reviews using the AMSTAR checklist have reported a statistically significantly increased risk of ovarian cancer associated with genital talc use. (10, 41, 42). See Section IX.IV for a summary of findings from epidemiological studies.

2. **Consistency and Replication.** These findings of a statistically significantly increased risk of ovarian cancer with talc use have been consistently replicated by several independent investigators in different population, and different settings across different data sources using different study designs. These slight differences in magnitude of risk reflect differences in inclusion or exclusion criteria and the accumulation of evidence over time. The meta-analysis of case-control studies has consistently shown a statistically significantly increased risk, whereas the meta-analysis of cohort studies has also shown an excess risk, (42) which failed to reach statistical significance, due to inadequate statistical power and low number of events; but the confidence intervals of results between the two study designs overlap providing evidence of consistency. The number of ovarian cancers in the case-control studies exceeds the number of ovarian cancers in the cohort studies by several fold. (42).

3. **Strength of Association.** The cumulative strength of association for the increased risk of ovarian cancer associated with talcum powder containing products is significant and ranges from 30 % to 60% %. The strength of association is similar to estimates of other established carcinogens (e.g., 24 % increased risk of lung cancers in non-smokers exposed to environmental tobacco smoke) (44), hormone replacement therapy and breast cancer (RR 1.33, 95% CI: 1.24-1.44) (45), particulate matter and lung cancer (PM_{2.5}: RR 1.09, 95% CI: 1.04, 1.14 and PM₁₀: 1.08, 95% CI: 1.00-1.17). (46). Beyond carcinogens, there are well established examples of causal associations in epidemiology, such as in the case of particulate matter and myocardial infarction, where the statistically significant excess risks are in the order of even less than a percent (carbon monoxide: 1.048, 95% CI: 1.026-1.070; nitrogen dioxide: 1.011, 95% CI, 1.006-1.016; sulfur dioxide: 1.010, 95% CI: 1.003-1.017; PM₁₀: 1.006, 95% CI: 1.002-1.009; and PM_{2.5}: 1.025, 95% CI: 1.015-1.036 and ozone: RR 1.003, 95% CI: 0.997-1.010; P = .36). (47).

4. **Exposure-Response Assessment.** The assessment of exposure-response or biological gradient is hindered by the difficulty in quantifying talcum powder use usually collected by

self-reported data (frequency, amount, and duration), timing and patterns of use (e.g., douching), and other individual factors (e.g., co-existence of inflammatory conditions such as endometriosis and or vaginal bleeding) resulting in differences in measurement of exposure across studies. As discussed in the dose-response summary of epidemiological studies below, some studies have measured the frequency of exposure, others the duration of exposure with few studies measuring the combined duration and frequency or intensity of exposure. (48). It is important to interpret the exposure-response data in the context of mechanistic studies which report that talc accelerates the development of ovarian cancer through alteration of the redox state in epithelial ovarian cancer cells, (49) and a monotonic dose-response curve may not accurately reflect this mechanism of development of ovarian cancer mediated via inflammation and alterations in redox states. Some epidemiologists have argued that it is difficult to know how dose-response should be modelled and it is unclear why nature would mandate a monotonic dose-response gradient. (50). Although it is difficult to know how to model the talc-ovarian cancer exposure-response assessment, it is possible that an agent which accelerates the development of cancer could account for threshold effects rather than monotonic dose-response effect. Despite these challenges, I address studies which have shown evidence of dose-response as measured by an increased risk with increased frequency, (48, 51-55) or increased duration, (52, 54, 56) or a combination of frequency and duration of exposure. (52, 57). Some studies have also shown evidence of increased risk with increased number of lifetime applications, (10, 48, 52) which may be a more accurate measure for long term exposure outcome association mediated via inflammation. The most updated meta-analysis reported an increased risk with >3600 lifetime applications compared to <3600 lifetime applications of perineal talc based on data from case-control studies. (42). A limited number of studies have shown no evidence of dose-response either with increased frequency or duration of exposure. (58-60).

5. **Retrograde Migration of Talc and Routes of Talc Exposure.** Talcum powder particles can migrate to the fallopian tubes and ovaries. (61-63). Talc and/or other constituents have been detected within the ovaries of women who report perineal talc use, (64) and found deeply embedded within ovarian tumors. (62, 65). Talc has also been reported in the lymph nodes which could occur through migration absorption or inhalation with transport through the lymphatic system. (66). Although an industry funded study performed by the Cosmetic, Toiletry, and Fragrance Association failed to detect translocation of “measurable quantities of talc” in unrelated monkey models, (67) the timing and techniques of assessment and intraspecies differences could not completely rule out migration of talc particles. Furthermore, supportive evidence for migration comes from the findings of a decreased risk of ovarian cancer with tubal

ligation and hysterectomy, (62) evidence of migration of other particles such as starch. (68). The FDA concluded that the “potential for particles to migrate from the perineum vagina to the peritoneal cavity is indisputable.” (69). A secondary route of exposure is inhalation. (36, 70).

6. **Multiple Biological Mechanisms of Talc Induced Ovarian Cancer.** Although not an absolute requirement for demonstrating causality, there is strong evidence that talcum powder products can induce ovarian cancer through established biological mechanisms (Section X). (39, 49, 71, 72). Inflammation plays a leading role in ovarian cancer and talc has pro-inflammatory effects; it also induces alterations in redox potential and pro-oxidant effects. (49) In ovarian cells talc has been shown to increase proliferation, increase neoplastic transformation and increase reactive oxygen species in the ovarian cells. (71). Talc has also been shown to be mutagenic in human ovarian epithelial cells through increased activation of gene activating transcription factors. Finally, the presence of asbestos and other Group 1 carcinogens likely contributes to the carcinogenicity of talcum powder products, and provides biologic plausibility for the consistent and significant increased risk seen in the epidemiologic studies on Talc and Ovarian cancer.

VIII. METHODS FOR THE OVERVIEW OF SYSTEMATIC REVIEW OF OBSERVATIONAL STUDIES OF GENITAL TALC USE AND OVARIAN CANCER.

I conducted an overview of systematic reviews and meta-analysis of observational studies of genital talc use and ovarian cancer. I included systematic reviews regardless of the performance of quantitative synthesis as meta-analysis may occasionally not be performed for data from observational studies. To inform the causal question, I also evaluated additional studies which provided evidence on the causal question of whether talcum powder products induce ovarian cancer. I critically appraised the meta-analysis using the 11- item AMSTAR (Assessing the methodologic quality of Systematic Review) checklist for systematic reviews and meta-analysis. (12) The individual epidemiological studies were also evaluated and summarized for their key strengths and limitations.

VIII.I. Systematic search. I performed an initial systematic search of Scopus and PubMed with the following search terms on June 12, 2017:

Pubmed: ("talc"[MeSH Terms] OR "talc"[All Fields]) AND ("ovarian neoplasms"[MeSH Terms] OR ("ovarian"[All Fields] AND "neoplasms"[All

Fields]) OR "ovarian neoplasms"[All Fields] OR ("ovarian"[All Fields]
AND "cancer"[All Fields]) OR "ovarian cancer"[All Fields])

Scopus: (TITLE-ABS-KEY (talc) AND TITLE-ABS-KEY (ovarian AND cancer)

VIII.II Eligibility Criteria. I included and considered epidemiological studies, including case-control studies, cohort studies and systematic review and meta-analysis which reported on the association between talc and ovarian cancer. I searched the references of included studies and citing articles to find additional original articles. I also included in vitro, animal, and human epidemiologic studies that reported data that either support or refute the role of talc in the development of ovarian cancer. I excluded duplicate articles identified in the two databases, articles with no original data, narrative reviews, commentaries and opinion pieces, and citations not relevant to the present scenario. The title and abstracts of each manuscript were reviewed to identify potential studies for inclusion in this report. I also searched the reference of included studies to find relevant citing articles. New studies were identified after evaluating citing articles. I reviewed the full length of each of these manuscripts and provide a summary of their key findings below.

IX. RESULTS.

The results of the initial search yielded 273 citations. I included 9 studies in the section on overview of systematic reviews and meta-analysis. (10, 13, 39-42, 57, 73, 79). I also assessed the 29 case-control studies, (48, 51-60, 62, 66, 75-91) and 3 cohort studies (14, 17, 92-93). The list of excluded citations is shown. The difference in the citation count of included and excluded articles largely reflects excluded duplicate articles retrieved from the two databases. I also evaluated several studies (36, 37, 49, 64-68, 72, 94-109) which reported on the biological mechanisms that supported or refuted the causal association between talcum powder products and ovarian cancer.

IX.I. Overview of Systematic Reviews and Meta-analysis. Three meta-analysis were not preceded by a systematic search (57, 73, 79). There were 4 systematic reviews and meta-analysis which evaluated the link between perineal talc use and ovarian cancer (39-42) using summary data, while an individual participant data analyses pooled data from case-control studies in the Ovarian Cancer Consortium (10). Another systematic review and meta-analysis analysis conducted on behalf of the manufacturer only evaluated the use of cosmetic talc on

contraceptive diaphragms and ovarian cancer (13) and was not directly relevant to the causal question of genital talc use and the development of ovarian cancer, but was critically evaluated for strengths and weaknesses. The results of the methodologic assessment of each of these using the AMSTAR checklist is summarized in the Table 1. Two meta-analysis (13, 40) are of poor methodological quality. Regardless, the findings of older meta-analysis have been superseded given the publication of new meta-analysis. (41, 42).

1. In 1992, Harlow et al. combined crude odds ratios from their case-control study, discussed below with 5 pre-existing existing case-control studies (79) to evaluate the association between perineal talc exposure and ovarian cancer. The studies included 1106 cases and 1756 controls, with talc exposure reported among 50.7% of cases and 46.9% of controls. Using crude odds ratios from the individual studies, perineal exposure to talc was associated with a statistically significantly increased risk of ovarian cancer (OR 1.3, 95% CI: 1.1-1.6). Major limitations include the lack of a systematic search methodology.

2. A 1995, meta-analysis by Gross and Berg (39) was conducted on behalf of the manufacturer Johnson and Johnson. A search of PubMed issuing the terms “ovarian cancer” and “talc or cosmetic” identified 9 case-control studies and reported a statistically significant increased risk of ovarian cancer in both the crude odds ratio (1.27, 95% CI: 1.09-1.48) and adjusted odds ratio (1.31, 95% CI: 1.08-1.58). They also examined the odds ratio by tumor type and notes that all the analyses produced relative risks greater than 1 with confidence intervals that exceeded 1. Despite the statistically significantly increased risk seen in analyses, the authors concluded that the *“literature does not unequivocally support the hypothesis.... But [does] suggest the possibility of an increased risk of ovarian cancer due to perineal talc use.”* The description of study procedures was incomplete, and the search strategy was limited. The study was supported in part by the manufacturer.

3. Cramer et al. 1999 combined crude odds ratio data from their case-control study with pre-existing case-control studies in a meta-analysis of 14 total case-control studies, (57) and reported a statistically significant OR of 1.36 (95% CI: 1.24-1.49). The tests for statistical heterogeneity were not significant (p=0.085). Limitations include the lack of a systematic search.

4. Huncharek, for his 2003 publication, conducted a meta-analysis of 16 studies including 11,933 subjects. (40). They searched MEDLARS, Embase and Cancer Lit databases using search term “talc exp ovarian neoplasms.” They excluded studies on borderline tumors or those which did not report on types of perineal exposure (dusting vs sanitary napkins). The meta-analysis was conducted using adjusted measures of effect using the inverse variance method. It included 15 population-based and 1 hospital-based study and excluded the 1983 Hartge study. (76). The pooled analyses yielded a significantly increased risk of ovarian cancer (RR 1.33, 95% CI: 1.16-1.45) associated with the perineal use of talc without evidence of statistical heterogeneity. Seven studies reporting on the number of talc applications per month were evaluated where the highest risk category (RR 1.21, 95% CI: 1.00-1.45) and lowest risk category (RR 1.83, 95% CI: 1.55-2.15) reported an increased risk. In sensitivity analyses, hospital-based studies showed no statistically significant excess risk between talc use and ovarian cancer risk, i.e., RRs 1.19 (95% CI: 0.99-1.41) versus population-based studies which showed an increased risk (RR 1.38, 95% CI: 1.25-1.52), despite the proportion of controls using talc being similar across the two designs. The confidence intervals were overlapping suggesting that the findings were consistent. Recent updated meta-analysis discussed below report similar estimates from hospital and population based studies. (42). The RRs were relatively stable even after exclusion of the single cohort study or limiting the analysis to studies that controlled for body weight and BMI. The authors stated that the association between talc use and ovarian cancer could also be attributed to exposure misclassification among prevalent cases or side effects of treatment such as radiotherapy and chemotherapy which may predispose to talc use (“reverse causality”). Study limitations include the inability to conduct meaningful dose-response analysis because only nine of the 16 studies provided data on dose-response, with substantial differences in dose stratification levels among these studies.

5. Langseth reported on a meta-analysis of 20 case-control studies and one cohort study in 2008. The various case-control studies provided a significant excess risk (10 studies) and non-significant excess risk in 10 studies. (73). The prospective cohort study reported no association between cosmetic talc use and all types of ovarian cancer combined but showed evidence of an increase in serous tumors. The hospital-based case-control studies reported a pooled OR of 1.12 (95% CI: 0.92-1.36) and population-based case-controls studies reported a pooled OR of 1.40 (95% CI: 1.29-1.52). The combined OR from all case-control studies using the fixed effects model was 1.35 (95% CI: 1.26-1.46).

6. Terry et al conducted an individual participant pooled analysis of eight case-control studies was conducted by the investigators for the Ovarian Cancer Consortium. (10). Genital powder use was defined as any powder use (talc, cornstarch, deodorizing) applied directly or indirectly (with sanitary pads, tampons or underwear) to genital, perineal or rectal area. Criteria for exposure varied from ever use to one year or longer. Women who reported both genital and non-genital powder use were considered genital users. Cumulative exposure was calculated by multiplying months of use by frequency of use. Never users and women who reported non-genital powder use were considered as the reference group. Analyses were adjusted for potential confounders such as age, duration of contraceptive use, parity, tubal ligation history, BMI and race/ethnicity. Family history of breast and ovarian cancer was not included in the final model. Genital powder use was reported in 25% of controls and 31% of cases. The rates of genital powder use varied widely between studies ranging from 15-45% in the control group. Ever regular uses of genital powder reported a statistically significantly increased risk of ovarian cancer (OR 1.24, 95% CI: 1.15–1.33) compared to non-users. There was no evidence of heterogeneity in the studies regardless of the reference group ($P_{\text{heterogeneity}}=0.61$). Results were similar when the reference group included those with genital powder use and never users. Risk was elevated for various histologic subtypes of ovarian cancer including invasive serous (OR 1.20, 95% CI: 1.09–1.32), endometrioid (OR 1.22, 95% CI: 1.04–1.43), and clear cell (OR 1.24, 95% CI: 1.01–1.52) tumors, and for borderline serous tumors (OR 1.46, 95% CI: 1.24–1.72). There was an increased risk of all nonmucinous subtypes of epithelial ovarian cancer combined across quartiles of genital powder use compared with nonuse: (OR_{Q1} 1.18, 95% CI: 1.02–1.36; OR_{Q2} 1.22, 95% CI: 1.06–1.41; OR_{Q3} 1.22, 95% CI: 1.06–1.40; OR_{Q4} 1.37, 95% CI: 1.19–1.58). Although a significant increase in risk with an increasing number of genital powder applications was found for nonmucinous epithelial ovarian cancer when nonusers were included in the analysis ($P_{\text{trend}} < 0.0001$), no significant trend was seen when analyses were restricted to ever users ($P=0.17$). After excluding those with tubal ligation or hysterectomy, the results were similar. Restricting analysis to applications before tubal ligation made no substantive difference. There was an evidence of interaction by BMI, with the risk being higher for women with BMI $< 30 \text{ kg/m}^2$ (OR 1.28, 95% CI: 1.17-1.39) than women with BMI $\geq 30 \text{ kg/m}^2$ (OR 1.14, 95% CI: 0.98-1.32; $P_{\text{interaction}}=0.01$). There was no evidence of interaction by tubal ligation, parity, endometriosis or post-menopausal status. The association was similar for women who used powder during varying time periods (1952-1961; 1962-1972; and after 1972). The strengths of this meta-analysis include the use of individual participant data, which allowed them to conduct dose-response analysis and analysis by histologic subtype. The lack of statistically significant evidence on non-

mucinous cancer could be attributed to the low number of users, or talc may not be relevant to these tumor types which have different biological mechanisms. The limitations include the definition of exposure as genital powder user varied from ever user, ever regular user to powder use for at least 6 months or at least 1 year in the studies.

7. Berge et al. 2018, a meta-analysis of 27 studies (41) (24 case-control studies and 3 cohort studies) was conducted according to the Preferred Item for Reporting of Systematic Reviews and Meta-Analysis Guidelines. (110). The authors searched multiple databases including Pubmed, Embase and Scopus. They examined the citations independently and in duplicate. They rated the studies using the New Castle Ottawa scale for study quality. They conducted meta-regression for duration (RR for every 10-year increase in duration) and frequency of genital talc use (RR for one time/week increase in frequency) for studies reporting at least three categories of duration or frequency after excluding the non-exposed category. Dose-response analysis was conducted using two methods. Study specific slopes were estimated from the natural logarithm of the risk estimates within each study; in a second step the slopes were pooled using a random-effects model. The study specific estimates were pooled in a single meta-analysis in the second method. Six of the case-control studies were hospital-based and the remainder were population-based. Most of the studies were conducted in North America and Europe. They reported a statistically significant increase in risk of developing ovarian cancer with talc use (adjusted RR 1.22, 95% CI: 1.13-1.30). A statistically significant risk was seen in the case-control studies (RR 1.26, 95% CI: 1.17-1.35), whereas the excess risk in the cohort studies did not reach statistical significance (RR 1.02, 95% CI: 0.85-1.20; $P_{\text{heterogeneity}} = 0.007$). There was no difference between results for borderline (RR 1.27, 95% CI: 1.09–1.44) and invasive ovarian cancer (RR 1.20; 95% CI: 1.08–1.31). There was a trend in RR with duration and frequency of genital talc use and suggestion of dose-response. There was a statistically significant risk for only serous carcinoma (RR 1.24, 95% CI: 1.15–1.34) and no other histologic subtypes ($P_{\text{heterogeneity}}$ between histologic types was 0.04). Use of talcum powder in the “early” period showed increased_risk of ovarian cancer (RR 1.18, 95% CI: 0.99–1.37). The use in the “late” period was higher (RR 1.31, 95% CI: 1.03–1.61; P-value for test for heterogeneity between the groups of studies was 0.37), arguing against the hypothesis that a higher risk would be seen only among those with earlier exposure during time-periods in which talcum powder was reported to contain asbestos. The cut-off points varied between studies was variable between 1970 and 1980. Use of sanitary napkins or diaphragms was not associated with an increased risk of ovarian cancer (RR 1.00; 95% CI: 0.84–1.16, and RR 0.75, 95% CI: 0.63–0.88, respectively).

Stratified analysis based on the adjustment for confounders (use of oral contraceptives and hormone replacement therapy, socioeconomic status/ education, BMI) found no evidence of heterogeneity. Meta-regression using the two different approaches yielded similar results. Based on the two-step approach, a 10-year increase in genital talc use was associated with a RR of 0.97 (95% CI: 0.82–1.12; nine studies reporting on duration), whereas the RR for an increase of one application per week was 1.03 (95% CI: 0.82–1.25; five studies reporting on frequency). There was no evidence of publication bias on visual inspection of funnel plot and the Egger test ($P=0.7$), with the cumulative meta-analysis reporting stabilization RR of in the range of 1.20–1.25. Stratified analyses conducted did not suggest the possibility of residual confounding (i.e., higher adjusted estimates than unadjusted estimates).

There are some limitations to the analysis. While the role of selection and recall bias is a possibility, given higher estimates reported from recent studies, such biases should account for increase in recall for all histologic cancer subtypes and not just serous ovarian cancer. Importantly, the dose-response analyses analyzed duration and frequency separately and not the intensity of exposure (duration combined with frequency) or cumulative exposure to talc and the exclusion of the reference category from the dose-response curve diminished the power of the dose response analysis to detect any threshold effects.

8. Penninkilampi, et al. 2018 (42), the most recent and comprehensive meta-analysis which focused on studies with greater than 50 cases of ovarian cancer also reported on data from 26 case-control studies (13,421 cases and 19,314 controls) and 3 cohort studies (890 cases). The study was also conducted according to the PRISMA protocol and included a search of multiple databases (MEDLINE, PubMed, EMBASE, Cochrane Central Register of Controlled Trials) and LILACS. They also evaluated the quality of studies using the Newcastle Ottawa Scale. They also evaluated long term talc use in which OR were extracted for group with the longest duration of exposure compared to controls, if there was a minimum of 10 years of talc exposure. Lifetime applications within each study were divided into < 3600 lifetime applications (equivalent to less than 10 years) and >3600 applications or more than 10 years of exposure. The number of lifetime applications is a better marker of intensity of exposure compared to duration or frequency of exposure alone. They assessed publication bias using the failsafe method where the failsafe number is the number of studies missed to nullify the findings of meta-analysis.

This was a well-conducted analysis and some strengths and limitations are notable. They found all studies to be of reasonable quality and did not exclude studies based on study quality. None of the analyses in this review had statistically significant heterogeneity except for non-perineal application arguing for the consistency of estimates. Any perineal talc use was associated with an increased risk of ovarian cancer (OR 1.31, 95 % CI: 1.24-1.39). Greater than 3600 lifetime applications were more associated with ovarian cancer than lifetime applications of less than 3600, although risks were significantly elevated in both groups. While the case-control studies reported a statistically significantly increased risk of ovarian cancer (OR 1.35, 95% CI: 1.27-1.43), the cohort studies reported an increased risk which was not statistically significant (OR 1.06, 95 % CI: 0.90-1.25).

9. Meta-analysis on Talc-Dusted Diaphragms and Ovarian Cancer. Another meta-analysis of 9 case-control studies by Huncharek et al. (13) reported on exposure to talc dusted diaphragms and ovarian cancer. On one hand, the authors dismissed the “talc hypothesis” for potential carcinogenicity, but then argued that talc dusted diaphragms was a more “intuitive model” for testing whether talc exposure increased the risk of ovarian cancer without any biological evidence (or references) to support this intuition. They searched MEDLARS, Cancer Lit and Current Contents. They included 9 studies and the pooled analyses yielded an excess risk of ovarian cancer which was not statistically significant (RR 1.03, 95% CI: 0.80-1.33). Exclusion of the study in which exposure to dusted diaphragms was assumed rather than measured further elevated the OR, which was not statistically significant (OR 1.12, 95% CI: 0.84–1.48) similar to a non-significant elevation in OR after the exclusion of the studies not published as full research articles.

This meta-analysis was flawed for several reasons. The most important limitation was its exclusive focus on talc powder dusted diaphragms as the route of exposure which could not inherently address the causal question of whether genital talcum powder dusting is associated with increased risk of ovarian cancer. As a result of this narrow hypothesis, they excluded several available studies that reported a statistically significant excess risk of ovarian cancer with perineal talc use. Several methodological flaws include the exclusion of the lowest category of exposure for some studies, (51) data extractions errors for others (56), and inclusion of ineligible studies that did not disaggregate data between talc and cornstarch users. (77) The study was by Johnson & Johnson and Luzenac America and was of poorer methodological quality than those conducted by their academic counterparts (43). As a result of these serious methodological

flaws, and the publication of several newer, higher quality meta-analysis with updated data, (10, 41, 42) the findings of this study have been superseded.

It is important to note here that while the AMSTAR checklist evaluates the methodologic quality of systematic reviews, several studies shown below were published prior to the publication of the AMSTAR checklist.

IX.II. Case-Control Summaries.

1. More than three decades ago Cramer et al. (75) evaluated 215 white women diagnosed with epithelial ovarian cancer identified through 12 hospitals in the greater Boston area. They were randomly matched by age, race and residence to 215 population-based controls. Surgical specimens were reviewed to confirm and classify tumors by histologic type. Talc exposure was determined through in person interviews. Multivariable logistic regression was used to estimate the Relative Risk. Ninety-two (42.8%) cases regularly used talc either as a dusting powder on the perineum or on sanitary napkins compared with 61 (28.4%) controls.

Adjusted for parity and menopausal status, this difference yielded a RR of 1.92 (95% CI: 1.27-2.89) for ovarian cancer associated with talc exposure. Women who had regularly engaged in both practices had an adjusted RR of 3.28 (95 % CI: 1.68-6.42; $P < 0.001$) compared to women with neither exposure. After adjusting for religion, marital status, educational levels, ponderal index, age at menarche, parity, oral contraceptive or menopausal hormone use and smoking the RR was attenuated but remained statistically significant (RR 1.61, 95% CI: 1.04-2.49). The limitations of the study include the potential for selection bias in controls because of high rates of non-participation, although RR remained statistically significantly elevated even though the analysis was restricted to 121 cases matched with controls without a referral. Since approximately 50% of ovarian cancer cases in the Boston area was sampled, any potential for pervasive selection bias of cases was minimal. Other potential limitations include the adjustment for only a limited set of confounders such as parity and menopausal status.

2. Hartge et al. 1983 (76) conducted a hospital-based case-control study of women with pathologically confirmed primary epithelial ovarian cancers matched to equal number of women for conditions other than gynecologic, psychiatric, or malignant diseases or pregnancy in the same hospitals in Washington, DC. Controls were frequency matched for age, race and hospital. Exposure to talc was ascertained through questions about reproductive and sexual history, medical history, drug use, and other exposures. The questions for talc use were added after the study began yielding 135 cases and 171 controls.

Among the women users of talc in sanitary napkins, underwear, or the genital area there was an excess risk of ovarian cancer (unadjusted RR 2.5, 95 % CI: 0.7-10.0) which was not statistically significant due to small sample size (n= 7 cases and 3 controls). The limitations to the study include the limited number of cases and controls reporting genital use of talc (n=10) and publication as a letter to the editor which may or may not undergo peer review depending on editorial practices at the journal. They did not report adjusted results of ovarian cancer after perineal exposure to talc. Another limitation is the potential for recall bias; however, this was likely minimal given similar reporting of douching practices in cases and controls.

3. In 1988, Whittemore et al. (58) evaluated 188 pre-menopausal and postmenopausal women between the ages of 18 and 74 with primary epithelial ovarian cancer in Santa Clara County hospitals or at the University of California, San Francisco Medical Center. The diagnoses were subsequently histologically verified. One group of controls was selected from the hospital (n=280); and a second group was selected from the population using random digit dialing (n=259). Exposure to talcum powder products was determined through a structured in-person interview at home where subjects were asked about whether they had used talcum powder products on the perineum, sanitary pads and/or diaphragms. Data was recorded by type (perineum, sanitary pads, diaphragm or some combination thereof), and duration of use.

Population cases were more likely to be younger and more likely to be premenopausal than cases and hospital-based controls. Approximately 52% of cases reported talc use compared to 46% controls (RR 1.40, p=0.6). After adjusting for parity and oral contraceptive use, perineal use of talc was associated with an excess risk of ovarian cancer that was not statistically significant (RR 1.45, 95% CI: 0.812.60). Women who used talc an average of 1-20 times per month reported an excess risk in comparison to those who used it less frequently which was not statistically significant (RR 1.27, p=0.29). The risk among users of more than 20 times per month was 1.45 times greater than non-users, but the findings were not statistically significant (p=0.09). The overall increased risk in overall applications per month was 1.30 (p=0.19).

Although the data showed a *trend* of increasing risk with increasing frequency of perineal exposure, the trends were not statistically significant and there was no trend with increasing duration of exposure. The risk of ovarian cancer with talc use between one and nine years was 1.6 times the risk of those with a shorter duration (95% CI: 1.00-2.57; p=0.05), and the risk among those with more than 10 years of exposure was 1.11 higher than that of non-users (95% CI: 0.74-1.65; p=0.61).

The limitations of the study are the inability to interview cases and the choice of two controls. Some amount of non-differential misclassification of exposure may bias findings towards null. The dose-response analysis was limited by the inability to determine the combined effect of frequency and duration of exposure. The study reported a statistically increased risk of ovarian cancer with coffee consumption and a non-significant reduction in risk with smoking. Subsequent meta-analysis (111) or Mendelian randomization (112) studies have confirmed that there is no association between coffee consumption and ovarian cancer, whereas smoking has a heterogeneous relationship to ovarian cancer which varies by histologic subtypes. (112) The reports of such additional spurious associations suggest an element of measurement error in their database.

4. Harlow et al. 1989 (77) conducted a population-based case-control study which included 116 females 20-79 years old with *serous and mucinous borderline ovarian tumors* identified using International Classification of Disease (ICD)-9 codes from the cancer registries of three western urban counties in Washington State. An independent pathology review confirmed diagnosis for 73% of tumors with 94% agreement, so the additional 33 cases were included. A sample of 158 controls of white women was identified through random digit dialing. Women with bilateral oophorectomy were excluded from the analysis. Any exposure to talc including any perineal exposure to powder, method of use, type of powder use (cornstarch, baby powder, talc, deodorizing powder), and combinations of method and type was ascertained through in-person interviews.

The study reported no statistically significant increased risk of ovarian cancer with perineal use of dusting powders (RR 1.1, 95% CI: 0.7-2.1). When looking at unspecified talc adjusted for the same factors, the RR was 1.0 (95% CI: 0.4-2.4). However, women who reported any use of talc containing powder on sanitary napkins showed an excess risk which was not statistically significant due to limited statistical power (RR 2.2, 95% CI: 0.8-19.8). However, among the sample of women who used deodorizing powders alone or in combination with talc, the risk of ovarian cancer was RR 2.8 (95% CI: 1.1-11.7) attributed to the potential exposure to asbestos. The limitations to the study include the potential for selection bias since 30% of cases and controls did not participate, although their characteristics were like the included participants which may have limited any impact. It is also possible that these findings are limited to borderline rather than malignant ovarian cancers.

5. In 1989, Booth et al. (51) conducted a population-based case-control study of 280 cases of ovarian cancer in women under 65 years of age from 13 hospitals in London and two in

Oxford. 451 controls were selected from other hospitals as enough age-matched controls were unavailable. The study included both pre- and post-menopausal women. Ovarian cancer was determined through hospital diagnoses with pathological specimens being histologically classified. Serous tumors were most prevalent, though mucinous, endometrioid and clear cell carcinoma was included. Information regarding talc exposure was obtained through a questionnaire and frequency of talc use was reported as never, rarely, monthly, weekly, or daily talc use.

After adjusting for age and social class (based on occupation of the husband for married women, and their own occupation for women who were not married) talc users reporting use more than once a week had a higher risk compared to never users. (RR 2.0, 95 % CI: 1.3-3.4). Those who reported daily use also had a non-significantly higher risk (RR 1.3, 95% CI: 0.8-1.9). There was some amount of missing data (8% of cases and 4% of controls), and no consistent trend of increasing risk with increasing frequency of use. However, data was not available on the duration of talc exposure to conduct meaningful dose-response analysis.

6. In 1992, Harlow et al. (79) included 235 cases of white women between the ages of 18 and 76 who had been diagnosed with ovarian cancer at one of 10 hospitals in the Boston metropolitan area. Controls were randomly selected from the town books; annual publication lists and address lists within 2 years of the age of case as potential controls. Cancer was confirmed through an independent pathology review. Talc exposure was determined through in-person interviews. Talc exposure from infancy with diapering, or use on other parts of the body, was not included. Talc use in other parts of body was considered unexposed. Talc use was reported as any genital application, type of application (sanitary napkin/underwear, via partner or application to diaphragm, via dusting to perineum), number of applications per month, years of use, age at first use, years since last use, whether use was before or after 1960, brand of application, estimated total lifetime applications, estimated applications excluding use after hysterectomy or tubal ligation, and estimated applications excluding use after hysterectomy or tubal ligation and use during nonovulatory months. The Chi square test for change in linear trend based on change in deviance in models.

Most participants reported use of baby powder. Perineal talc use was associated with an increased risk for ovarian cancer (OR 1.5, 95% CI: 1.0-2.1) when adjusted for parity, education, marital status, religion, use of sanitary napkins, douching, age, and weight. Perineal use of talc via dusting powder to perineum was associated with a significantly increased risk of ovarian cancer OR 1.7 (95% CI: 1.1-2.7), whereas use by sanitary napkins, underwear, use via

diaphragms was not associated with a significantly increased risk. Adjusted risk was highest for endometrioid tumors (OR 2.8, 95% CI: 1.2-6.4) and borderline tumors. A greater proportion of women with endometrioid tumors reported more than 10,000 lifetime applications of talc during ovulatory cycles while having an intact genital tract compared to other histologic types (34 % vs 16%, respectively). The risk of cancer increased significantly with increased frequency of applications per month using a linear test trend as a continuous variable. The risk was highest among the women who applied talc once daily relative to non-users. Women who applied talc for more than 10 years were at 60% greater risk for ovarian cancer relative to non-users. An 80% excess risk was associated with an estimated exposure of more than 10,000 applications. The association between talc and ovarian cancer was greater than in talc products before 1960. Restricting the analysis to exposure during ovulatory months, women with intact genital tract and more than 10,000 applications during ovulatory cycles had a threefold increase in risk of ovarian cancer. Limitations included the high rates of non-response (n=31% cases and 19% of controls) and failure to adjust for family history of ovarian cancer and oral contraceptive use.

7. Chen et al. 1992 (78) evaluated 112 cases of ovarian cancer in Beijing China. The diagnosis was confirmed by laparotomy and pathological examination. Serous cancer accounted for 51% of cases, mucinous for 19%, and miscellaneous epithelial for 30% of cases. Two controls were matched for each case using random selection from the same street, office, or township. A comprehensive questionnaire was administered through face-to-face interviews and collected information about menstrual, obstetric, marital, medical, familial, and dietary histories with reference to events 3 years or more prior to diagnosis. A total of 224 controls were selected. Talc exposure was measured through a yes or no metric, for exposure occurring 3 or years prior to date of diagnosis or equivalent date in controls. Logistic regression was conducted to estimate relative risk.

The mean age of participants was 48.5 and 49 years among cases and controls respectively. After adjusting for education and parity, there was an excess risk of ovarian cancer associated with a history of long-term (>3 months) application of dusting powder to the lower abdomen and perineum (RR 3.9, 95% CI: 0.9-10.6) which was not statistically significant due to limited statistical power (n=7 cases and 5 controls reporting powder use). The limitations of the study include the small sample size, loss to follow up and death, the inability to fully ascertain all cases of ovarian cancer and the exclusion of controls with other health problems. Although the applicability of these findings from a Chinese population to a US population is limited, the

findings of an increased risk in different parts of the world provide evidence in support of an increased risk of ovarian cancer with dusting powder use.

8. In 1992 Rosenblatt et al. (80) conducted a hospital-based case-control study of the association between genital and respiratory talc exposure and the development of epithelial ovarian cancer at the Johns Hopkins Hospital. Among 140 diagnosed cases of epithelial ovarian cancer, approximately 108 were successfully interviewed. Seventy-seven pathologically-confirmed incident cases diagnosed within 6 months of admission were matched to age-race matched controls (n=46). Exposure was ascertained using a structured questionnaire administered at home and in the hospital. Conditional logistic regression was used to obtain strength of the association.

Although genital powder use was not associated with an increased risk of ovarian cancer, statistically significant increased risk was observed for exposure to talc on sanitary napkins (OR 4.79, 95% CI: 1.29-17.79) after adjusting for confounders such as obesity, socioeconomic status, religion, reproductive status and oral contraceptive use, with a smaller risk after genital bath exposure (RR 1.7, 95% CI: 0.7-3.9). An excess risk of borderline significance was seen for exposure of ≥ 37.4 years (RR 2.4, 95% CI: 1.0-5.8). The limitations include the small sample size, lack of data on frequency of talc use, and the limited generalizability of the findings from one hospital. The control group also reported a very high rate of talc use (90%) which may have limited the ability to detect any differences.

9. In 1993, Tzonou et al. (81) reported on a hospital-based study of 189 women under 75 years of age with histopathologically confirmed ovarian cancer in Athens, Greece compared with 200 hospital visitor controls in two hospitals. Control patients were those hospitalized in the same ward as cancer cases. Talc exposure was determined by asking participants to report talc use (over an extended period before the onset of illness for cases and for a comparable period among controls) among other characteristics, through interviews in the hospital. Talc use was reported as a yes/no metric. Estimates were adjusted for age, years of schooling, weight before onset of the disease, age at menarche, menopausal status and age at menopause, parity and age at first birth, tobacco smoking, coffee drinking, consumption of alcoholic beverages, hair dyeing and mutual (analgesics-tranquilizers/hypnotics) tranquilizers.

An exceedingly small number of cases (n=6) and controls (n=7) reported perineal use of a talc. There was no statistically significant increased risk of ovarian cancer associated with perineal application of talc (RR 1.05; 95% CI: 0.28 to 3.98). The limitations of the study include the low

proportion of talc exposure, which was ascertained in only approximately 3% of cases and controls.

10. In 1995, Purdie et al. (82) evaluated 824 histologically confirmed cases of epithelial ovarian cancer and 860 controls from gynecological oncology treatment centers in the three most populous Australian states. Controls were selected from electoral rolls in Australia where electoral participation is mandatory using a random procedure to match the age distribution of cases. Talc exposure was determined through face-to-face interviews conducted by trained interviewers using a standard questionnaire.

After adjusting for parity, there was a statistically significant increase risk of ovarian cancer reported with talc use on the abdomen or perineum (OR 1.27, 95% CI: 1.04-1.54). The limitations include high non-response rates in controls which may differ from the source population, but the age distribution of controls was like non-responders suggesting minimal response bias by age. There is also the possibility of bias in the selection of cases. They only adjusted for a limited set of confounders. Some misclassification of outcome is also possible given borderline and malignant cases were lumped together, although no differences were found when results were analyzed separately. Recall and interviewer bias was minimized by trained interviewers who administered standardized questionnaires.

11. In 1996 Shushan et al. (83) reported on findings from a study of two hundred living cases aged 36-64 years with history confirmed diagnosis of primary invasive or borderline invasive ovarian cancer in the Israel Cancer registry. There were 408 women from the same area selected by random digit dialing. Both were interviewed using standardized questionnaires.

A larger proportion of cases than controls reported using moderate to a large amount of talc (10.5% vs 5.6%; $P=0.04$) compared to never users or seldom users, a difference which was statistically significant. Limitations include high refusal rate for cases (30%), the low rates of talc exposure among controls and limited adjustment for confounders. (14)

12. In 1997, Cook et al. (84) reported on 329 white women between the ages of 20-79 diagnosed with epithelial and borderline ovarian cancer identified through the Cancer Surveillance System of Western Washington. Women were randomly selected as controls using random digit dialing from a larger pool of women for cancer studies. Genital powder exposure was collected through structured in person interviews and reported as any lifetime powder application, method of use (perineal dusting only, diaphragm only, sanitary napkin only, or genital deodorant spray only). Additional exposure information included cumulative

lifetime days of use for dusting and similar metrics for other methods of use. Genital powder use was also separated into use of talcum powder, baby powder, cornstarch, deodorizing powder, bath/body powder, or unspecified powder. Analysis was presented by age because adjustment for other confounders such as income, marital status, body mass index, oral contraceptive or parity did not change results.

Genital powder exposure was more common among cases (50.8%) than controls (39.3%). After adjusting for age, any use of genital powder was associated with a statistically significant increased risk of ovarian cancer (RR 1.5, 95% CI: 1.1-2.0) compared to non-use, although there was no clear pattern of increasing risk after increasing duration of use. After adjusting for age, exclusive use of perineal dusting was also associated with a statistically significant increased risk of ovarian cancer (RR 1.8, 95% CI: 1.2-2.9), whereas the risks for use via other routes of exposure (e.g. diaphragms, powder) were not significant. There was a statistically significant increased risk of serous tumors associated with any genital powder application (RR 1.7, 95% CI: 1.1-2.5), but not for the smaller number of mucinous or endometrioid tumors. Limitations include low participation rates (64.3% for cases, 68% for controls), the potential for recall bias, and confounding by family history of ovarian cancer in a study where more than 50% of controls were less than 45 years of age.

13. In 1997, Chang et al. (56) conducted a population-based case study of cases of borderline and invasive histologically confirmed ovarian cancer among participants aged 35 to 79 years from Canada. Talc exposure was determined through a questionnaire conducted during an in-home in person interview to detail medical and reproductive histories. Powder use was reported as talc, cornstarch, or a mixture. Information was provided for type of exposure, number of uses per month, years of use, years of use pre- and post-1970, and well as years of use before and after a tubal ligation or hysterectomy. They adjusted for age, years of oral contraceptive use, number of full-term pregnancies, duration of breastfeeding per pregnancy, tubal ligation, hysterectomy, and having a mother or sister with breast or ovarian cancer.

Talc exposure was reported in 44% of cases and 35.6% of controls. After adjusting for confounders there was a statistically significantly increased risk of ovarian cancer associated with any talc exposure via sanitary napkins, direct application to the perineum or both (OR 1.42, 95% CI: 1.08-1.86). The dose-response analysis showed a borderline-significant association was detected between duration of after-bath talc exposure and risk (OR 1.09, 95% CI: 0.98-1.21, per 10 years of exposure), without any significant association between frequency of exposure and

risk. Although risk was elevated for both invasive and borderline carcinomas, it was statistically significant only for invasive carcinoma. The limitations of the study include the potential for recall bias and the high rates of non-response (28.7% for cases and 35.5% for controls)

14. Green et al. 1997 (62) conducted a population based case-control study of 824 women aged 18-79 with histologically confirmed ovarian cancer compared to 824 controls. The methods and limitations were similar to the study by Purdie et al. (82). The prevalence of talc use was approximately 40% in the control use. Perineal talc was significantly associated with ovarian cancer (RR 1.3, 95% CI: 1.1-1.6), without any effect of longer duration of talc use. Compared to women who had neither used talc nor had sterilization, the risk was highest among talc users without surgery like the findings by Whittemore et al. (58). There is the potential for recall bias, and the quantity of talc use was unknown.

15. In 1998, Godard et al. (85) examined 170 French-Canadian women with a histologic diagnosis of ovarian cancer from 2 large Montreal teaching hospitals. Cancer diagnoses were histologically confirmed, and pathology reports were reviewed for tumor classification. 170 population-based controls were identified using modified random digit dialing to match the age distribution of cases. Talc exposure was obtained through a 57-item questionnaire. 70% of interviews were conducted in person in clinics and 30% were conducted via phone. Talc use was reported through an ever/never metric for perineal use.

Only 10.6% of cases and 4.7% of controls reported talc use. As a result, perineal talc use was associated with an increased risk for ovarian cancer which was not statistically significant (RR 2.49, 95% CI: 0.94-6.58; $P = .066$) because of limited statistical power. Similar patterns of excess risk which did not reach statistical significance were seen in both the comparisons for sporadic and familial cases and controls. The limitations of the study include a modest non-response rates among cases (13%) and controls (10.7%).

16. In 1999, Cramer et al. (57) evaluated 563 ovarian cases identified through tumor boards and statewide cancer registries in Massachusetts or New Hampshire in a population-based control study. Pathology reports were reviewed, and slides were sought in any case where there was a discrepancy between histologic description and final diagnosis. Controls were selected from the population using random digit dialing with a response rate of 72% among eligible controls. Talc exposure was obtained through questionnaires in which potential controls and cases were blinded. Specific hypothesis regarding talc use were not discussed. Exposure was assessed prior to 1 year before date of diagnosis or date of interview for

controls. Talc use in the genital or rectal area, on sanitary napkins and on underwear was considered as exposure whereas non-use and non-genital use was considered as unexposed. Exposure from condoms and diaphragms was not assessed.

Genital talc exposure was reported in 27% of cases and 18.2% of controls and the average duration of talc use exceeded more than 20 years in cases and controls. There was a statistically significantly increased relative risk of ovarian cancer with genital talc exposure 1.60 (95% CI: 1.18-2.15) after adjusting for age, study center, tubal ligation, BMI, parity, or primary relative with breast or ovarian cancer. The highest risk was seen among women whose age at first use was between 20 and 25 (RR 1.87, 95% CI: 1.03-3.39) those who have used talc for less than 20 years (RR 1.86, 95% CI: 1.16-3.00), those whose total applications is less than 3000 (1.84, 95% CI: 1.12-3.03), women who used talc when nulliparous (RR 2.80, 95% CI: 0.64-12.20), and those with serous invasive tumors (RR 1.70, 95% CI: 1.22-2.39). Only one case and 3 controls reported primarily using cornstarch, these numbers are likely accurate for talc use, despite the potential for including other kinds of powders. There was little evidence of effect by confounders such as age, oral contraceptive use and parity. Linear trends were significant in models that included women who were not exposed without any clear trend in duration or intensity of exposure in models that excluded women who were not exposed. Analysis of dose-response censured after closure of female tract or non-ovulatory cycles, and models showed a trend this was statistically significant only after inclusion of non-genitally exposed categories ($P_{\text{trend}}=0.022$).

Potential limitations include the potential for recall bias, although this is likely to be minimal and more likely to occur for short term exposures rather than long term exposures. The evidence for substantial degree of recall bias is refuted by the findings that there is no evidence of higher proportion of perineal talc exposure reported among cases in more recent compared to older studies to suggest stimulated reporting, no evidence of significant excess of non-genital talc exposure among cases, and the excess is limited to invasive serous carcinoma,(84) rather than all types of ovarian cancer or endometrial carcinoma.

17. In 1999, Wong et al. (86) reported-on a hospital-based study of 499 patients with epithelial ovarian cancer and 775 age-matched controls with non-gynecologic cancer diagnoses. Cancer diagnoses were confirmed in the cancer registry. Exposure was ascertained through self-administered questionnaire in which approximately 15% of participants did not respond to questions about talc use or its frequency.

Talc use was reported by 47.8% of cases and 44.9% of controls. Genital talc use was reported by 34% of cases and 32.2% of cases. The mean duration of talc use was 22 years in controls and 21 years in the study population. After adjusting for age at diagnosis, parity, oral contraceptive use, smoking history, family history of epithelial ovarian cancer, age at menarche, menopausal status, income, education, geographic location, history of tubal ligation, and previous hysterectomy there was no statistically significant increased risk of ovarian cancer among ever users of talc (OR 0.92, 95% CI: 0.24-3.62). There was no significant association between duration of use and development of ovarian cancer even after prolonged exposure of more than 20 years. However, when evaluating genital talc use via histologic subtypes of cancer, all ORs were above 1 (except for undifferentiated carcinoma) but were not statistically significant. Similarly, those who had no history of genital tract interruption the ORs were elevated but not statistically significant. However, the study was limited by the non-response rate and the choice of a controls with malignancies. (113). Additionally, data on exposure were reported on a self-administered questionnaire rather than administered by interviewers. The results could not rule out the effect of talc exposure via condom use and data was not available on the frequency of talc use.

18. Ness et al. (87) conducted a population-based control study. Cases (20-69) years of age with recent diagnosis of ovarian cancer (n=) were compared with community-based controls 65 years or younger through random digit dialing. Controls were age-matched as well as matched by last 3 digits of the phone number. Approximately 72% of controls were selected. As a part of detailed interviews with calendars women were asked about their reproductive history including talc use. The question was, "As an adult and prior to [reference date] did you ever use talc, baby or deodorizing powder, at least once per month for 6 or more months on your: 1) feet, arms, or breasts, but not the genital or rectal areas? 2) genital or rectal area? 3) on your sanitary napkins? 4) on your underwear? 5) on your diaphragm or cervical cap?" They were then asked whether they had a male sexual partner(s) for more than a year who regularly used such products on his genital area or underwear. The duration of use of talc for each of these modes of use was also queried. The estimates were analyzed using conditional logistic regression after adjusting for age and gravidity (each as continuous variables), race (white/black/other), history of ovarian cancer in any first degree relative (yes/no), oral contraceptive use (yes/no), tubal ligation (yes/no), hysterectomy (yes/no), and breast-feeding (yes/no).

Talc use was reported in 53.2 % of controls. Compared to never talc use, talc use on all parts of the body (OR 1.4, 95% CI 1.1-1.6), genital/rectal (OR 1.5, 95% CI 1.1-2.0) on sanitary napkins

OR 1.6, 95% CI 0 1.1- 2.3) and underwear OR 1.7, 95% CI. 1.2-2.4) was associated with a statistically significantly increased risk of ovarian cancer after adjusting for confounders. However, talc use on diaphragms (OR 0.6, 95% CI 0.3-1.2) or by male partner (OR 1.0, 95% CI 0.7 to 1.4) was associated with an increased risk which was not statistically significant. Although duration of talc use did not show a pattern of increased risk with increased risk with duration of exposure, the OR for each categories (> 1 year, 1-4 years, 5- 9 years and > 10 years) were elevated and were statistically significant for 1-4 years. Tubal ligation and hysterectomy decreased ovarian cancer risk. Limitations to the study include the low response rates among cases and controls due to exclusion of prevalent ovarian cancer. Recall bias while always a concern was less likely to be a concern given that risk factors overall did not increase risk but were limited to those linked to inflammation.

19. In 2004, Mills et al. (59) conducted a population-based case-control study of 256 women with histologically confirmed incident epithelial ovarian cancer from 22 counties in Central California. They also selected 1122 controls who were residents of that area who had one intact ovary and no history of ovarian cancer. Talc exposure was determined through phone interviews conducted by trained interviewers. Talcum powder use in the genital area was reported as an ever/never metric, as well as by frequency, duration, and cumulative use. The final parsimonious model adjusted for age, race, duration of oral contraceptive use and breast feeding.

The rates of talc use in controls was 37.1 % and higher among white non-Hispanics. Controls were more likely to have been outside the US. Most of talc exposed cases and controls were non-white. There was a statistically significant risk of ovarian cancer associated with genital talcum powder use (OR 1.37, 95% CI: 1.02-1.85) after adjusting or age, race, duration of oral contraceptive use, and breast feeding. Although increasing frequency of use showed a 74% increased risk among women who used talcum powder more than 4-7 times per week ($P_{\text{trend}}=0.015$), this risk was not monotonic because risk the decreased between second (rarely to several times per month) and third categories (1 to 3 times per week). Duration of use also showed increasing risk and peaking between 4-12 years of use and declining thereafter ($P_{\text{trend}}=0.045$). Cumulative exposure increased in the second and third quartiles of exposure but declined among the highest quartile of users ($P_{\text{trend}}=0.051$). The risk was highest among those who had stopped using talcum powder in the last 1-2 years compared to those in the more distant past. The risks were primarily elevated for serous and mucinous tumors. Risk was higher among those reporting use after 1975 which may be related to the recency of use, and those after age 20. Limitations of the study include a low response fraction which was only

40% for eligible cases and 57% for eligible cases, and high rates of non-participation- 34.2% among cases and 29.3% among controls. The dose-response analysis did not exclude exposure during non-ovulatory periods or after gynecologic surgery which may have diluted the relative risk estimates. However, strengths include the ability to rule out prevalent cases by examining incident cases alone.

20. In 2004, Langseth et al. (88) conducted a case-control study of pulp and paper workers from different mills in Norway. Only one of these mills reported use of fibrous talc. They included 46 cases and reviewed histological records for each case. Most of the cases were invasive tumors. Four controls free of ovarian cancer and having intact ovaries were matched by birth year +/- 2 years and were drawn by incidence density sampling. A total 179 controls were available for analysis. Talc exposure was determined through personal interviews which took place in mill offices, at home, at a medical institution, or by phone. Talc exposure was reported environmentally and as use by personal hygiene (diapers, sanitary napkins, non-genital area or husbands use in genital area)

Talc exposure was reported among 50% of cases and 48% of controls. After adjusting for number of children, breastfeeding, age at birth of first and last child, age at menarche, age at menopause, smoking, and family history the use of talc use by personal hygiene was associated with an excess risk of ovarian cancer OR 1.15 (95% CI: 0.41-3.21), which was not statistically significant. The study has significant limitations. The sample size of the study was low with limited statistical power to detect a two-fold increased risk with a probability of only 53 % and response rate for interviews were low -76.1% for cases and 65.7% for controls. The inclusions of non-genital or husband's use in genital area among the exposed category diluted the estimates of relative risk for ovarian cancer associated with talc exposure. More information on cases was collected from relatives than controls because 71.5 of cases were deceased compared to only 28.6% of controls. The rates of missing data on talc use was high, because it was obtained from proxy respondents introducing an element of uncertainty in the estimates for relative risk of ovarian cancer associated with talc use.

21. In 2008, Merritt et al. (89) reported on a population-based study of 1,576 women with epithelial ovarian cancer as part of the Australian Ovarian Cancer Study. Pathology reports and diagnostic slides were reviewed for a sample of 87 women with 97% agreement with original abstracted data. Cases were confirmed by histopathology. 1509 controls were selected from the electoral rolls and were matched by age and residence. Talc exposure was identified through a comprehensive health and lifestyle questionnaire. Talc use was reported as

ever/never for perineal use (powder or talc in the genital area or on underwear or on sanitary napkins), years of use prior to surgery, use post-surgery, and use stratified by age at diagnosis. All analyses were conducted for talc use while the reproductive tract was patent and exposure occurring 12 months prior to the diagnosis of cases and similar period in controls was excluded.

The rate of talc use was 43% among controls and 46% among cases. When adjusted for age, education, parity, and oral contraceptive use of talc in the perineal region among women with patent tubes there was a statistically increased risk of ovarian cancer (OR 1.17, 95% CI: 1.01-1.36) with the highest risk reported for serous tumors (OR 1.21, 95% CI: 1.03-1.44). The tests for trends for duration of use were of borderline statistical significance for all cancers and serous subgroup ($P_{\text{trend}} = 0.02$ for both). No significant associations between number of years used pre- or post-surgery and significantly elevated risks for overall cancer and serous ovarian cancer were seen in women both above 70 years of age, and below 50 years of age suggesting that timing of talc exposure (before or after 1976) did not affect results. There was no association between PID and the risk of ovarian cancer or the protective effect of NSAIDs. Limitations include low response rates and the lack of data on the frequency of exposure.

22. In 2008 Gates et al. (55) conducted a nested case-control study as part of the New England Case-Control study and the Nurses' Health Study (NHS). Further cohort analysis from the NHS are presented in the section on cohort studies below. **Section IX.III.I** Ovarian cancer diagnoses were confirmed by the researchers. They included 1385 cases and 1802 controls. 76.7 % of cases were incident with respect to the timing of DNA collection in the NHS. Exposure was assessed through a questionnaire that asked questions related to use of talcum powder. The NECC questionnaires included questions about regular use of talcum, baby or deodorizing powder as an adult. Specific questions asked about type of use (as a dusting powder to the genital area, sanitary napkins, underwear, or non-genital areas), frequency of use, age at first use, number of years used, and brand of powder used. The 1982 NHS questionnaire requested information on whether the participant had ever commonly applied talcum, baby, or deodorizing powder to the perineal area (no, <once/week, 1-6 times/week, or daily) or to sanitary napkins (yes/no). The study defined regular genital talc use as application of powder to the genital/perineal region at least once per week. We also created a categorical variable for frequency of talc use, using the categories from the NHS questionnaire.

Most of the participants were white. Regular genital talc was reported among 56 cases and 44 controls, and daily genital talc use reported among 35 cases and 25 controls, respectively. There was a statistically significant increased risk of total epithelial ovarian cancer (RR 1.36, 95% CI: 1.14-1.63; $P < 0.001$) and of serous invasive subtype (RR 1.60, 95% CI: 1.26-2.02) associated with regular use of talc when adjusted for age, study center, duration of oral contraceptive use, parity, tubal ligation, BMI, and duration of hormone use. The New England Case-control study had a higher RR associated with genital talc use than the Nurses' Health which had a smaller sample size. There was a statistically significant trend between increasing frequency of talc use and risk of both total and serous invasive ovarian cancer in the pooled analyses ($P_{trend} < 0.001$ for both total and serous invasive ovarian cancer). The association between talc and ovarian cancer was stronger among women with the glutathione S-transferase M1 (GSTM1) null genotype ($P_{interaction} = 0.03$), particularly in combination with the GSTM1 present genotype alone ($P_{interaction} = 0.03$) in two independent study populations. The strengths of the study include robust findings from two independent study populations. Although talc exposure was only measured in the 1982 NHS questionnaire when participants were between 36 to 61 years of age, the number of users who began talc use after this is likely small as shown by the fact that more than 95% of controls with regular talc in the NECC reported talc use before age 35. The consistent findings from the prospective NHS study and the NECC may have minimized any potential biases due to the case-control design. Since talc exposure was defined as at least once per week, such habitual exposure is less susceptible to recall bias than sporadic exposure.

23. In 2009, Wu et al. (48) conducted a population-based study of 609 cases of women and 688 controls between the ages of 18 and 74 residing in Los Angeles with histologically confirmed incident invasive or borderline ovarian cancers. Cases were identified through the Surveillance, Epidemiology and End Results (SEER) Program. Cases were matched to neighborhood controls on age and race/ethnicity. Controls were women with one intact ovary with no history of cancer except non-melanomatous skin cancer matched on age and race/ethnicity. Talc exposure was determined through a detailed interview by the same person which included a comprehensive questionnaire that used a reference date of 2 years before the date of diagnosis (or date of interview for controls). Talc use was reported as a yes or no metric (including yes or no for perineal area use), frequency and duration, total times of use, and total times of use before and after 1975. Few users of talc (24) had tubal ligation or hysterectomy prior to talc use and were considered as non-users.

The cases were primarily white woman but also included 41 African American women, 136 Hispanic women, and 51 Asian women. After adjusting for race, age, education, tubal ligation, family history, menopausal status, use of oral contraceptives, and parity perineal use of talc was associated with a statistically significantly increased risk of ovarian cancer (RR 1.53, 95% CI: 1.13-2.09). Elevated risks were also noted among those who used it on sanitary napkins, underwear and on diaphragms but not significant due to limited statistical power. There was a clear trend of increasing risk with increasing frequency of use among users who had used it for more than 20 years. The risk of ovarian cancer increased significantly with increasing frequency and duration of talc use; compared to never users, risk was highest among long duration (20 years), frequent (at least daily) talc users (RR 2.08, 95% CI: 1.34-3.23). The risk increased significantly with lifetime total times of talc use, but the association was limited to those who started talc use before 1975 ($P_{\text{trend}} < 0.001$). The association between talc use and ovarian cancer was strongest for serous ovarian cancer. Risk of ovarian cancer increased with the diagnosis of endometriosis. Limitations include the rates of non-response among cases and controls, and classification of talc use among a small number of users with prior hysterectomy as being non-exposed. However, the effect of this misclassification is likely to be minimal.

24. In 2009, Moorman et al. (90) reported on a study involving 1,114 cases with histopathologically confirmed tumors as part of the North Carolina Ovarian Cancer Study. newly diagnosed cases were identified through the North Carolina Central Cancer Registry. All cases were confirmed by histopathologic review. Controls were frequency matched to cases and recruited from the same geographic region using random digit dialing. The controls could not have had a bilateral oophorectomy. Talc exposure was reported through in-person interviews conducted by nurses with life calendar and pictures of contraceptives, menopausal hormones, and other medications were used to help aid recall. Talc use was reported as a yes/no metric.

The analysis focused on invasive ovarian cancer which comprised of 78% of cancers for African-Americans and 79% for whites. Among controls, talc use was reported by 23.9% among whites and 31.2% of African-Americans. After adjusting for age there was an excess risk reported for both whites (OR 1.04, 95% CI: 0.82-1.33) and African Americans (RR 1.19, 95 % CI: 0.68-2.09) which were not statistically significant. Limitations include the high rates of non-response (33.5% among cases, 39.1% among controls), with higher non-response rates among African-Americans. There was a large proportion of missing data on talc use for cases and controls; 23.6% and 38.5% among whites, respectively, and 25.2% and 29.1% among African Americans, respectively, resulting in misclassification of exposure. The authors did not

clarify the route of talc exposure and may have classified non-genital talc exposure to the talc exposed group which may have diluted the RR. Additionally, the study did not adjust for confounders to address the timing, frequency and duration of talc exposure, or whether talc exposure occurred before or after tubal ligation or hysterectomy.

25. In 2011, Rosenblatt et al. (60) reported on a study of women between the ages of 35 and 74 from 13 counties in Washington state. Cases of borderline or invasive epithelial ovarian cancer were identified through the Cancer Surveillance System. Controls were selected from the population using digit dialing. Talc exposure was determined through in person interviews which included a reference period of unstated length before diagnosis or interview. For powder use on sanitary napkins and deodorant spray, the total number of months of use was recorded. For powder use on perineum after bathing, only intervals of at least one year when powder was usually used was recorded. Talc use was reported as genital powder exposure by type of use, duration of use, lifetime applications, age at first use, age at last use, calendar year of first use, time since first use, and time since last use.

Perineal use of powder after bathing was reported in 12% of controls. Reporting of cornstarch was uncommon in the study. After adjusting for age, calendar year of diagnosis, county of residence, number of full term live births, and duration of hormonal contraception the perineal use of powder after bathing was associated with an increased ovarian cancer risk (OR 1.27, 95% CI: 0.97-1.66) which was not statistically significant, but a statistically significant increased risk was seen among women with borderline tumors (OR 1.55, 95% CI: 1.02-2.37), similar to that reported by Harlow et al. (79) There were no differences in risk among various types of powder use, as the risk among those who reported use of talcum powder was RR 1.38 (95% CI: 0.77-2.47). There was no difference in exposure outcome relationship between talc use before and after 1980. There was no pattern of risk associated with perineal dusting powder and the increasing extent of use as defined by years in which it was used or number of lifetime applications. The participation rate of cases and controls was modest at 76.8% and 69%. Some misclassification of exposure is possible as participants may be unable to provide accurate information on whether the specific powder contained talc. However, the presence of talc, rather than a specific dose, is the primary determinant of exposure in which case genital powder use is a reasonable proxy for talc exposure.

26. Kurta et al. 2012 (91) reported on a case-control study from the Hormones and Ovarian Cancer Project using 902 ovarian cancer cases and 1802 controls. Participants were diagnosed with histologically confirmed ovarian, fallopian tube or peritoneal cancers. They were at least

9 years old and within 9 months of diagnosis. Controls were frequency matched by age and area code to cases at 2:1 ratio. Trained interviewers collected data via questionnaires. Perineal talc use was defined as ever using dusting powder or deodorizing spray on the genital or rectal areas, on sanitary napkins or underwear or on diaphragms or cervical caps.

Perineal talc use was reported among 20.9% of controls and 27.6% of cases. After adjusting for age, race, education perineal talc was associated with a statistically significantly increased risk of ovarian cancer OR 1.40 (95% CI: 1.16-1.69). Limitations include the population which was women seeking treatment for infertility which may limit generalizability.

27. In 2015, Wu et al. (53) evaluated 1,701 newly diagnosed histologically confirmed cases of invasive epithelial ovarian cancer cases of ovarian cancer among participants aged 18 and 74 in Los Angeles county identified through the USC Cancer Surveillance Program. Cases were primarily white but 308 Hispanic Women and 128 African American women were also included. Controls were selected from residents of LA county and were matched to cases on race/ethnicity and year of birth. Talc exposure was ascertained through in person interviews conducted using standardized questionnaires with a reference date of 12 months prior to diagnosis (or date of interview for controls). Genital talc was reported as no use or less than one year of use, yes use, and use per 5 years of talc.

Among controls the prevalence of talc use ≥ 1 year was 30.4% in non-Hispanic whites, 28.9% in Hispanics and 44.1%. After adjusting for several confounders including race, age group, menopausal status, age at menarche, hormone therapy use, BMI, income, education, life births, tubal ligation, oral contraception, endometriosis, and first-degree family history of ovarian cancer there was a statistically significant increased risk of ovarian cancer associated with genital talc use across all races (OR 1.46, 95% CI: 1.27-1.69), non-Hispanic whites (OR 1.41, 95% CI: 1.21-1.67), and Hispanics (OR 1.77, 95% CI: 1.20-2.62) compared to non-use or less than 1 year of use. The risk was elevated but not statistically significant among African-Americans (OR 1.56, 95% CI: 0.80-3.04) because of low statistical power for the subgroup. Every 5-year use of talc was associated with a statistically significant risk of cancer among the overall population (OR 1.14, 95% CI: 1.09-1.20) and non-Hispanic whites and Hispanics, whereas the excess risk among African-Americans was not statistically significant. The non-response rate for cases (36.8%) and controls was modest. There was no evidence of systematic bias in the ascertainment of exposure as prevalence of various conditions such as endometriosis was consistent with other prior studies.

28. Schildkraut et al. 2016 (52) evaluated African women aged 20-79 years of as part of the African-American Cancer Epidemiology Study. They selected 584 cases of newly diagnosed epithelial ovarian cancer and matched 745 controls to cases on age and region of residence using random digit dialing. Talc exposure was determined through a telephonic interview which included information on baby powder use. Participants were considered regular users if they reported use at least more than 1 time per month for 6 months. Regular users were asked about genital or nongenital use, frequency, duration, and lifetime applications (number of applications per month by number of months used). Since there was a small number of users who reported only genital powder use, they were grouped with genital and non-genital users to "any" genital use. Exposure was examined by frequency of use (less than 30 times per month, daily), duration of use (<20 years, ≥ 20 years) and lifetime number of applications (<3600, ≥ 3600). They also assessed for reporting biases and the effect of stimulant reporting because of the filing of class action lawsuits.

The median duration of body powder use in both cases and controls was 20 years and body powder use were reported among 52.9% of controls. After adjusting for age at diagnosis/interview, study site, education, tubal ligation, parity, BMI, duration of oral contraceptive use, first degree family history of breast or ovarian cancer, and interview year there was a statistically significant increased risk of ovarian cancer with any genital powder use (OR 1.44, 95% CI: 1.11 to 1.86). There was a stronger association for ≥ 20 years of any genital powder exposure compared with <20 years of exposure and the test for trend was significant ($P_{\text{trend}} = 0.002$). Similarly, the ORs for association between daily any genital powder users and EOC were larger in magnitude than never users, and the test for trend was significant ($P_{\text{trend}} < 0.01$) There was also evidence of dose-response for any genital powder for the cumulative number of life-time applications with a higher risk among those with lifetime applications ≥ 3600 ; the test for trend was significant ($P_{\text{trend}} < 0.01$). A stronger association was reported among post-menopausal women who used HRT compared to non-users. There was also an increase associated with non-genital powder exposure (OR 1.31, 95% CI: 0.95-1.79) which was not statistically significant. There was no evidence of statistically significant increased risk with "only" non-genital users and serous ovarian cancer but was statistically significant increased for non-serous ovarian cancer.

Limitations include the assessment of data by self-report. The underreporting of powder use in the abdomen which may reach the genital area may have resulted in a spuriously increased risk among "only" non-genital users or such an effect may be specific to African-American users. Although there was some evidence that there was more reporting of genital powder use

after class action lawsuits in 2014, recall bias alone is insufficient to explain these findings because there was a statistically significantly increased risk both before and after 2014.

29. In 2016, Cramer et al. (54) included 2,041 ovarian cancer cases from Eastern Massachusetts and New Hampshire as part of the Nurses' Health Study and the Ovarian Cancer Association Consortium. Pathology reports were reviewed to confirm diagnosis. The population was primarily white with less than 30 participants who were African Americans, Hispanics, Asians, or other race/ethnicities. Controls were identified through random digit dialing, driver license and town-resident lists and were frequency matched to cases by age and residence. Talc exposure was determined through in person interviews with a reference point 1 year prior to diagnosis or date of interview (for controls). Subjects were asked whether they regularly or monthly applied powder to the genital or rectal area, or on sanitary napkins, tampons or on other non-genital areas. Talc exposure was reported as personal use, potential exposure with no personal use (diaphragm, condoms, partner use), any genital powder use, type of genital powder use (cornstarch, baby powder, other), age of first use, time since exposure ended, frequency of use, years used, months per year of use, and total applications. Lifetime application was assessed by multiplying frequency of application per month with months of exposure. This was divided by 360 to yield talc years which were partitioned into separate quartiles for dose-response analysis. The study adjusted for a variety of confounders, with adjustments for age, study center, study phase, race, BMI, height, weight, parity, breastfeeding, oral contraceptive use, IUD use, ovulatory cycles, endometriosis or painful periods, Jewish ethnicity, family history, personal history of breast cancer, menopausal status, current smoking, ever smoked, asthma, alcohol consumption, and acetaminophen, aspirin or ibuprofen use.

Any genital powder use was reported in 26% of controls. The women who exclusively used cornstarch were considered unexposed. Most talc users began talc exposure around the age of 20. Overall, genital powder use was associated with a statistically significant increased risk of ovarian cancer (OR 1.33, 95% CI: 1.16-1.52) adjusted for age, study center and phase. BMI, smoking and alcohol use did not alter the association by more than 10% suggesting a lack of confounding. Most women reported using Johnson's Baby Powder and Shower to Shower with a trend for increasing risk by talc years. The trend for frequency of use was significant, but the trend for duration of use was flat. The talc ovarian cancer association was largely confined to premenopausal women and post-menopausal women with hormonal therapy. Sensitivity analysis indicated that the risk of misclassification of exposure in controls would have to very high (18%) to nullify the increased risk shown in the study. No data is available

on the extent of misclassification of talc exposure. Although some amount of misclassification is possible in retrospective studies, such a large amount is unlikely as shown by estimates from other analogous exposure-outcome association such as alcohol and breast cancer in the Nurses' Health Study. (114).

IX.III Cohort Studies. I will discuss the cohort studies below. However, it is important to emphasize that none of the cohort studies discussed below were designed to evaluate the association between talc use and ovarian cancer at the time of cohort assembly. In other words, evaluating the association between talc use and ovarian cancer was not the a-priori primary objective of the study but evaluated as a subsequent hypothesis, with its inherent limitations. For example, the NHS cohort was assembled in 1976 but data on talc use was not collected until 1982. (14). In contrast the primary objective of most case-control studies noted above was to evaluate the risk of ovarian cancer associated with talc use.

IX.III.I. In 2000, Gertig et al. (14) reported on an analysis from the U.S. Nurses' Health Study. 121,700 registered nurses were enrolled in the study; 78,630 were included in the cohort study; and 307 cases of ovarian cancer in 11 states. Notably, the Nurses' Health Study was a broad-based study of women's health. Ovarian cancer information was obtained through a questionnaire mailed to married female nurses 30-55 years which were updated every 2 years. Talc exposure was obtained from a survey question which asked "Have you ever commonly used talcum, baby powder, or deodorizing powder a) to apply to perineal (private) area? No, daily, one to six times per week, or less than once per week or b) to apply on sanitary napkins? No, Yes." Frequency was thus both reported as an "ever, never" metric as well as applications per week but duration of use was not recorded. Information gathered by a questionnaire requesting information on perineal talc use was ascertained only in 1982, and never updated during follow-up. Medical records were obtained for women reporting diagnoses of ovarian cancer or those participants who died (mortality follow up was 98% complete). Histologic subtypes of ovarian cancer were determined from pathology reports and classified as serous (cystadenocarcinoma and papillary adenocarcinoma), mucinous (mucinous papillary adenocarcinoma and adenocarcinoma), endometrioid (clear cell and mixed epithelial), and borderline. Cases of epithelial ovarian cancer (ICD 183.0) confirmed by medical record review or death certificate between 1982-1996 were included in the analyses. Participants who did not respond to the 1982 question on talc use were excluded, as were participants with cancer other than non-melanomatous skin cancer, bilateral oophorectomy, ovarian removal and those with radiation therapy. They included 307 cases of ovarian cancer among 984,212 person-years of follow up (0.03% PYs or 31.2/100,000 PYs). Information on covariates was obtained from the

biennial questionnaire and included oral contraceptive use, tubal ligation, parity, family history (not asked until 1992), smoking and BMI. Age adjusted incidence rates were calculated after adjusting for covariates above, as well as age at menarche, duration of breast feeding, age at menopause. 40.4% (n=31789) reported ever talc use of which 14.5% were ever daily talc users. Women who were talc users and did not have a tubal ligation had no increased risk of epithelial ovarian cancer with talc use- no evidence of interaction. There was an increased risk for histologic subtypes of ovarian cancer with talc use which was not statistically significant (RR 1.09, 95 % CI: 0.86-1.37) after adjusting for age, duration of oral contraceptive use, body mass index, tubal libation history, smoking status, and postmenopausal hormone use. While daily talc use on perineum (RR 1.12, 95% CI: 0.82-1.55) or use less than once/week (RR 1.14, 95% CI: 0.81-1.59) was associated with an excess risk which was not statistically significant, the point estimates for talc use on perineum 1-6 times/week (RR 0.99, 95% CI: 0.67-1.46) and on sanitary napkins (yes/no) (RR 0.89, 95% CI: 0.61-1.28) were lower than 1, and these confidence intervals may not rule out an increased risk. Importantly, there was a statistically significant increased risk for ever talc use for serous invasive cancers (RR 1.40; 95% CI: 1.02–1.91). For women who reported ever daily use, the RR for serous invasive cancer was 1.49 (95% CI: 0.98-2.26). The RRs for ever-users of less than 1 time/week and of 1-6 times/week were 1.29 (95% CI: 0.81-2.04) and 1.49 (95% CI: 0.77-2.11), respectively ($P_{\text{trend}}=0.05$). Women above age 45 in 1982 who reported ever talc use had a higher risk of serous invasive cancer (RR 1.51, 95% CI: 1.07-2.15).

The strengths of the study include the prospective design which reduces the risk of recall bias. The relatively short follow up period may have been unable to determine ovarian cancer. The NHS cohort was not primarily designed to evaluate the association between talc and ovarian cancer. Further, as discussed above, determining “never” use based only on a one-time question near the start of the study (14 years prior to terminating the study in 1996) introduces unidirectional “behavioral change” bias, likely misclassifying some “ever” users who used talc during the study as “never” users; and biased the findings towards the null. The exclusion of prevalent cases of ovarian cancer allows one to determine the influence of exposure on incident ovarian cancer, it also introduces an element of selection bias. Of the initial cohort of 121,700 volunteers, only 78,630 women were enrolled. It is not known whether any (or how many) of the 43,000 excluded women had ovarian cancer, nor whether any (or how many) of any such ovarian cancer volunteers excluded were talc users. They could not determine the intensity of exposure as they had no information on duration of talc exposure, or number of life-time applications or the age at which talc was initiated. The study was not a “new user design” and

used prevalent rather than incident users, and is susceptible to “prevalent user biases.” (15) Prevalent users are “survivors” of the early period of talc use, which can introduce substantial bias if risk varies with time. This may bias findings towards the null due to the “depletion of susceptibles.” They had no data on the intensity of exposure because there was no data on the duration of talc use, or number of life-time applications. The analysis on tubal ligation could not determine whether talc use was initiated after tubal ligation. Any such misclassification of exposure is also likely to be non-differential and bias towards the null.

As a continuation of the Nurses’ Health Study, in 2010, Gates et al. reported on 924 cases of the ovarian cancer as part of Nurses’ Health Study with ovarian cancer confirmed by a gynecologic pathologist review of medical records. (92). They evaluated the findings between risk factors for ovarian cancer and histologic subtypes of ovarian cancer and information on talc exposure was collected through biennial questionnaires. Talc use was reported as either greater than or less than once a week. After adjusting for body mass index activity, past smoking, current smoking, family history of breast or ovarian cancer, age, parity, parous status, breastfeeding, oral contraceptive use, tubal ligation, hysterectomy, age at natural menopause, and estrogen use they reported a non-significantly increased risk of all epithelial ovarian cancer (RR 1.06, 95% CI: 0.89 to 1.28) with genital talc use > once/week compared to < once a week. Although the estimates for the RR were higher for mucinous subtype (RR 1.50, 95% CI 0.84-2.66), there was no evidence of interaction across the subtypes ($P_{\text{heterogeneity}}=0.55$) in this analysis. The strengths and weaknesses of this study are largely like the Gertig analysis of the NHS cohort above, with the additional limitations in the low number of cases (only 29 cases of epithelial ovarian cancer among genital talc users in 108, 870 women).

IX.III.II. In Houghton et al. (17) reported on finding from the Women’s Health Initiative Observational Study (50-79 years at enrollment and post-menopausal). Among the 93,676 volunteers, only 61,576 participants were in the study cohort, and 429 adjudicated incident ovarian cancer (0.7%). Participants completed annual mailed questionnaires. Participants with bilateral oophorectomy, unknown number of ovaries, history of cancer (except non-melanomatous skin cancers were excluded). Perineal powder exposure (rather than specifically talc use) was obtained via self-report at baseline, and not updated during follow-up. Participants were asked whether powder had been used on genital areas, diaphragm or sanitary napkin or pad. If the participant answered affirmatively, there were further questions regarding duration of use where participants indicate use for less than 1 year, 1-4 years, 5-9 years, 10-19 years, or 20

or more years, but frequency of use was not recorded. The area of use was assessed dichotomously, and duration of use was categorized as never, 9 years or less and 10 years or more for analysis. Analysis was conducted for ever perineal powder use (ever use for any of the three categories) and duration for any powder use (maximum duration of any single area of application). Cancer cases were self-reported and confirmed through medical records including pathology reports. Data on covariates for age, race, education, alcohol, metabolic equivalents, smoking, recreational physical activity, oral contraceptive use duration, hormone replacement therapy, family history, age at last birth, BMI, self-reported family history of ovarian cancer were evaluated. They also evaluated reproductive factors such as age at menarche, age at menopause, age at first birth, age at last birth, parity, breastfeeding duration, history of tubal ligation, hysterectomy, irregular cycles, endometriosis. The covariates were obtained at baseline and not updated. The proportional hazards analysis was conducted to examine the risk of ovarian cancer and proportional hazards was tested using Schoenfeld residuals. Participants with other cancers were still considered at risk for ovarian cancer. Covariates were selected for the multivariate analyses, if they had P-values of less than 0.1 during the backward regression until they had a parsimonious model. Additional variables from the literature were also included although they were not statistically significant. They analyzed ever perineal use, perineal use by application area, duration of use and combinations. Test for linear trend was evaluated across duration categories by modeling categories as continuous variables.

The average age of participants was 63.3 years at baseline with 12.4 years of mean follow-up. Most participants were white and were obese. Approximately 52.6% of the population reported ever use of perineal powder. Ever users were more likely to be heavier, used oral contraceptives and/or diaphragms. Perineal use of powder was associated with a 12% excess risk which was not statistically significant ($HR_{adj}, 1.12$, 95% CI: 0.92- 1.36) whereas point estimates for use on sanitary napkins and diaphragms were lower than 1 but could not rule out an excess risk. Duration of perineal, sanitary napkin or diaphragms were not associated with ovarian cancer. Strengths include the prospective design which reduces the risk of recall bias. Limitations includes the lack of information on whether the perineal powder use constituted talc use, and the inability to measure the frequency of exposure. It is possible that the analysis by duration included infrequent long duration users with short term frequent users which may result in bias towards null. Since exposure was not updated during follow-up, some never users who became ever users were misclassified as never users resulting in a bias towards the null. The exclusion of prevalent cases of ovarian cancer introduced an element of selection bias. Of the initial cohort

of 93,676 volunteers, only 61,576 women were enrolled; 10,622 volunteers who had already developed cancer at baseline were excluded. It is not known whether any (or how many) of these excluded women had ovarian cancer, nor whether any (or how many) were talc users. The inclusion of “prevalent users” rather than “incident users,” leads to depletion of susceptibles and may bias findings towards the null. Data on covariates was not available after baseline resulting in the potential inclusion of participants (e.g., oophorectomy) not at risk of ovarian cancer and resulting bias towards the null. The generalizability of the study findings to younger pre-menopausal women is also unknown as the study findings are limited to older post-menopausal women (average age =63.3 years).

IX.III.III. In 2016 Gonzales et al. (93) examined the relationship between douching, talc use, and ovarian cancer among 50,884 women aged 35-74 years of age (84 % white and 64% post-menopausal) who had never had breast cancer but had a full or half-sister who with breast cancer. They excluded participants with bilateral oophorectomy and ovarian cancer. Among 41,654 participants 154 incident ovarian cancers (n=135 ovarian cancers) were reported (0.3%). Participants completed a telephone interview which included questions about reproductive history (oophorectomies), health and lifestyle and use of personal care products before enrollment, including the use of douching and use of genital talc applied as a powder or spray applied to underwear, sanitary napkin, diaphragm, cervical cap, or vaginal area. The frequency of use was categorized as no use, less than once a month, 1-3 times per month, 1-5 times per week, > 5 times per week, but duration of use was not recorded. As with the WHI and Nurses’ study exposure was only measured at baseline and not updated during follow-up. Updated information on oophorectomy was collected during follow-up and information on cancer cases was collected via annual health update. Data on 37.6% of ovarian cancer cases was available only by self-report and the remainder confirmed by medical record review or death certificate. Cancer cases included tumors of the ovary, fallopian tubes, peritoneum, or of uncertain origin. Those who were BRCA1 or BRCA 1 positive test or those who had a sister with a positive test but had no report of negative test were considered BRCA positive. Cox proportional hazards analysis was conducted until diagnosis of ovarian cancer, oophorectomy, censoring or death. Generalized estimation equations was used to account for familial clustering at baseline. The proportional hazards assumption was evaluated by the goodness of fit test. A joint analysis of talc and douching use was also conducted. The included covariates were patency (yes or no for tubal ligation or hysterectomy), menopausal status, duration of OC use (none, < 2 to <10, 10 or more years), parity (yes/no) race and BMI.

The median duration of follow up was only 6.6 years. The average age was mean 57.8 years for cases. These cases were more likely to have a family history of ovarian cancer and carry a BRCA1 or BRCA2 mutation. More non-cases than cases used oral contraceptives. Talc use was only reported by 12% of cases and 14% of non-cases. Talc users were more likely to have BMI >30 kg/m². Talc use in the last 12 months after adjusting for race, BMI, parity, duration of oral contraceptive use, baseline menopausal status, and patency, was not associated with a statistically significant increased risk of ovarian cancer (HR 0.73, 95% CI: 0.44-1.20], but could not rule out an excess risk. There was no change in estimates when adjusted for douching. Douching at baseline, more common among talc users, was associated with increased risk of ovarian cancer (HR: 1.8 95% CI: 1.2-2.8).

There were significant limitations to the study. The authors acknowledge that an important limitation of their study was that they collected douching and talc information for the year before the study and did not account for the latency. As with the other two cohort studies, the Sister Study was limited by the issue of selection bias through the exclusion of women who had already developed ovarian cancer (and who could also have been lifetime talc users). Secondly, the Sister Study was vulnerable to behavioral change bias. The bias towards the null of this inaccurate assessment of “ever” user status prospectively, at the start of the study, was compounded by the fact that it was also vulnerable to retrospective inaccuracy, because it was based only on the 12 months preceding baseline. Thus, a participant who had last used talc 13 months before baseline would be categorized as a never-user, as would a participant who started using talc after baseline. Thirdly, the Sister Study’s median follow-up of only 6.6 years is likely insufficient to detect any risk of ovarian cancer which likely takes more than 6.6 years to develop. The study also suffered from the limitations of prevalent user biases. Additionally, exposure was measured as ever/never use in 12 months prior rather than total applications resulting in non-differential misclassification towards the null. Data was only available by self-report on the diagnosis of ovarian cancer for many cases (37.6%) resulting in misclassification of outcome, which was likely non-differential and may bias findings towards the null. The study reported the lowest rate of talc use among the cohort studies (13.8%), further compounding the limited statistical power due to a short duration of follow-up. The generalizability of these findings is also limited as they included women without breast cancer who all had a family history of breast cancer and may be at a higher risk (60%). The missing data were not missing at random and unclear whether analyses were adjusted for missing data. The authors concluded that the study

could not exclude a increased risk despite these findings. The study findings are limited to the predominant cohort of white post-menopausal women who constituted the majority of participants.

IX. IV. Summary of Findings from Epidemiological Studies.

1. The cumulative evidence from these studies demonstrates a statistically significant increased risk of ovarian cancer associated with perineal talc powder use which has been independently replicated by several investigators in different populations, different settings, across different sources using different study designs and time periods. Slight differences in magnitude of risk among these studies may reflect differences in inclusion or exclusion criteria and the accumulation of evidence over time and some variation due to chance. The updated meta-analyses in 2018, which have included all the studies, reported a statistically significant increased risk of perineal talc use and ovarian cancer, (41, 42), with little evidence of statistical heterogeneity or publication bias. The case-control studies provided 13,421 cases compared to 890 cases in the cohort studies. (42). Most case-control studies demonstrate an increased risk of ovarian cancer associated with talc use with an OR between 1.3 and 1.6, even after adjusting for various risk factors.

2. Meta-analysis which evaluate the association between perineal talc use and ovarian cancer have consistently shown an increased risk of ovarian cancer, (39, 41, 42, 73, 79), including pooled analysis using individual participant data. (10). My conclusions about the causal increase in the risk of ovarian cancer associated with talc exposure are heavily weighted by recent cumulative meta-analysis published in 2018, (41, 42). These meta-analyses provide the most comprehensive evidence base given the size of the study database and their methodologic superiority as assessed by the AMSTAR rating above. (Table 1). Also, importantly, there is no meta-analysis which has reported a statistically significant decreased risk of ovarian cancer with talc.

3. The only case-control study in which point estimates are below one was limited by the poor choice of controls and very high non-response rates. Despite these limitations it could not rule out a 21% increased risk of ovarian cancer associated with talc use which is not inconsistent with other studies. (86). Although the exposure rate to talc in the case-control studies has been variable in the control group from 5%-45%, this reflects the varying practices in the use of talc rather than the lack of an increased risk of ovarian cancer with talc use.

4. Although all studies are at potential risk of outcome misclassification, most of the studies used histologically verification for the diagnosis of ovarian cancer. Any such potential

misclassification of outcomes is likely to be non-differential and would have biased the findings towards the null.

5. There is no reason to believe, from the studies, that ovarian cancer would result in talc use, so the temporality of the association is established.

6. Case-control studies are susceptible to recall bias particularly when data on exposure are self-reported. However, several studies have included these questions on talc exposure as a part of larger questionnaires on other risk factors minimizing the possibility of recall bias. Recall bias is less likely to occur for chronic daily exposures such as talc as compared to intermittent short exposures. Further, recall bias is equally likely to affect other histologic types of ovarian (and endometrial) cancer but here the increased risk was limited to only epithelial ovarian cancer in most studies. Finally, the findings that only perineal talc use was associated with ovarian cancer but not with non-genital talc use argues against recall bias alone as a potential explanation of these findings.

7. Confounding is one potential explanation for these findings. However, several case-control studies adjusted for major confounders including the more recent case-control studies. (54). Although residual confounding is always possible in an observational study, studies that have reported adjusted and non-adjusted findings have reported similar results minimizing the impact of residual confounding. (41). Although there are some risk factors for ovarian cancer (e.g., genetic risk factors, family history, obesity and reproductive history), for any of them to be confounding to an extent that could account for the positive relations that have been reported, they would have to be strongly correlated with talc use. Family history, ethnicity, obesity and some reproductive risk factors are positively associated with the risk of ovarian cancer, but the magnitude of these associations does not appear high enough to introduce enough confounding, even jointly, to explain completely the positive association. To invalidate the statistically significant findings of an increased risk of ovarian cancer from the studies, one would have to postulate a degree of selection, recall bias and confounding pervasive across different time periods, different populations which is highly implausible.

8. Case-control studies are also at risk of selection bias which may introduce bias in both directions. As opposed to hospital-based controls, which may be less susceptible to selection bias, the population-based case-control studies have consistently showed a higher estimate of increased risk of ovarian cancer associated with talc use.

9. Reverse causality, where the diagnosis of ovarian cancer results in perineal use of talc, may be one possible explanation of the nonsignificantly increased risk in the group exposed to perineal talc. However, this is also likely minimal in the case of ovarian cancer in which most

cases present at advanced stages with abdominal bloating, and vaginal symptoms only occur in a small minority of cases.

10. One of the cohort studies reported an increased risk with perineal talc exposure and serous invasive cancer (14). The pooled results from all three cohort studies, reported an excess risk of ovarian cancer, (42) which failed to reach statistical significance because of several limitations. The duration of follow up was limited resulting in low number of events and inadequate statistical powder. The only cohort study which reported an inverse association between perineal talc use and ovarian cancer included several other cancers beyond the ovary (such as peritoneum, endometrial) (93), which may have diluted an increased risk. It had a very short duration of median follow up of approximately 6.6 years which is insufficient to ascertain the development of ovarian cancer. Since talc induced carcinogenesis occurs via a foreign body mechanism, the latency period required to demonstrate such an effect is long. Despite these limitations, the upper bounds of the confidence intervals exceeded one and could not rule out an increased risk of ovarian cancer with perineal talc use. The cohort studies were at risk of significant other biases. Exposure was measured at baseline and not updated during follow-up (14, 17), which may have misclassified those participants at baseline who were never users but used talc during the study as never users resulting in a bias towards the null. The exclusion of prevalent cases of ovarian cancer (some of whom may have been exposed to talc) may also bias their findings. (14, 17) The cohort studies were also susceptible to “depletion of susceptibles” biasing their findings towards the null. None of the cohort studies were primarily designed to study the association between genital talc use and ovarian cancer as their primary objective. Despite these limitations, the meta-analysis of cohort studies demonstrated a statistically significant increased risk of serous invasive ovarian cancer.

11. Ascertaining *dose response* relationship with talc and ovarian cancer is difficult because of the challenges in quantifying talcum powder use usually collected by self-reported data (frequency, amount and duration), timing and patterns of use (e.g. douching), and other individual factors (e.g. co-existence of inflammatory conditions such as endometriosis and or vaginal bleeding) resulting in differences in measurement of exposure across studies. The dose response depends on both the amount of talc exposure, the frequency of talc uses and the duration. It is difficult to quantify the amount of powder actually used and degree of perineal dusting that might constitute an “application of talc.” Another factor that may affect the dose-response relationship is whether use occurred at a time when the female tract was open, the age of initiation of talc use since the talc/ovarian cancer association is modified by closure of the female tract as a result of tubal ligation or hysterectomy (79). The presence of other risk factors

such as post-menopausal status, cancers other than invasive serous ovarian cancer may make it difficult to ascertain a dose-response relationship among older post-menopausal. The lack of statistical trend (58, 60) in some earlier studies may reflect some of these challenges as well the lack of a monotonic dose response effect. The exposure-response data need to be interpreted in the context of mechanistic studies which report that talc accelerates the development of ovarian cancer in susceptible individuals through accelerating the redox state in epithelial ovarian cancer cells. (49). Thus, an assessment of the gradient through a monotonic dose-response curve may not provide a complete picture of the biological gradient. It unclear why nature would mandate an increasing mono-tonic dose-response mechanism for causation, and some have argued that among Bradford-Hill viewpoints it is difficult to know how dose-response should be modelled. (50). Cumulative lifetime exposure may be a more appropriate measurement of exposure given the inflammatory mechanisms by which talc induces the development of ovarian cancer. It is important to recall that if the carcinogenicity of talc induced ovarian cancer most likely resembles that of asbestos induced mesothelioma (with which it shares histologic similarities), asbestos induced mesothelioma does not have a dose-response relationship. In the case of asbestos induced mesothelioma, latency may be more important whereas in the case of talc induced ovarian cancer induced by inflammation latency may be of lesser importance.

12. Despite these challenges, several studies have shown evidence of dose-response as measured by an increased risk with increased frequency (51-55) or increased duration, (52, 54) or combination of frequency and duration of exposure. (48, 54). Some studies show a exposure-response trend, (54) and the most updated meta-analysis show evidence of duration dose and responsiveness. (42). In the individual participant data meta-analysis a significant increase in risk with an increasing number of genital powder applications was found for nonmucinous epithelial ovarian cancer when nonusers were included in the analysis, but no significant trend was seen when analyses were restricted to ever users. (10) Importantly, the most recent meta-analysis reported an evidence of dose-response with risk being higher among those with >3600 applications of talc compared to participants with <3600 applications. (42) Both of these categories of exposure were associated with an increased risk of ovarian cancer. None of the cohort studies were able to conduct meaningful dose-response analysis because they did not collect data either on duration, (14, 93) or frequency of exposure. (17).

X. BIOLOGICAL MECHANISMS OF TALCUM POWDER INDUCED OVARIAN CANCER.

Although not an absolute requirement for determination of causation there are multiple well-established biological and molecular mechanisms by which talcum powder products induce ovarian cancer. The key routes of exposure and biological mechanisms are noted below.

X.I. Retrograde Migration of Talc Particles. Genital talc can migrate up to the fallopian tubes and ovaries and talc particles have been detected within the ovaries of women who report perineal talc use. Heller et al. detected talc in the ovaries of 24 women undergoing incidental oophorectomy demonstrating that it can reach the upper genital tract (64) although the fact that talc particle counts were unrelated to reported levels of perineal talc exposure reflects the challenges in measuring exposure to talc. Talc has been found deeply embedded within ovarian tumors, (65) and subsequent studies have confirmed that these are not due to contamination. (94). Talc has also been demonstrated in pelvic lymph nodes of women with perineal talc exposure.(66). Supportive evidence of migration comes from studies showing retrograde migration of additional particles such as starch after gynecological examination, (68) findings of a decreased risk of ovarian cancer with tubal ligation and hysterectomy in case-control studies, (87) and meta-analysis, (115) which may minimize exposure to inflammatory particles. Although an industry funded study performed by the Cosmetic, Toiletry, and Fragrance Association failed to detect translocation of “measurable quantities of talc’ in monkey models, (67) the timing and techniques of assessment and intraspecies differences could not rule out migration of talc particles. The FDA response to Citizen’s Petition 2014 concluded the “*potential for particles to migrate from the perineum vagina to the peritoneal cavity is indisputable*’. Johnson & Johnson and IMERYS documents also acknowledge migration. In one document it was stated, “A review of the literature suggests that it is biologically plausible for talc particles to migrate from the vagina to the peritoneal cavity and ovaries following perineal application.” (63, 116).

X.II. Inhalation of Perineal Talcum Powder. Inhalation of talcum powder is another potential route of exposure that is biologically plausible and can cause inhaled fibrous talc (and asbestos) fibers to reach the ovary and thus increase the risk of ovarian cancer in women using these products. Approximately 50 percent of talc particles in commercially available talcum powder are less than 10 microns in size, (117) which have the potential for inhalation and reach the alveolar regions of the respiratory tract. (118) Asbestos fibers can pass from the alveoli to the

lung interstitium, from which they can travel via the lymphatic system to the bloodstream and other organs including ovaries. (119, 120) Inhaled fibrous talc shares extensive physical and chemical similarities with asbestos, and inhaled fibrous talc generated from perineal application may also reach the ovaries by inhalation. This mechanism was confirmed in a September 2017 study, "Below the Waist Application of Johnson & Johnson Baby Powder," Longo, et al. showed that normal application of Johnson's Baby Powder can produce airborne asbestos and talc fibers which could be inhaled. (70).

X.III. Talcum Powder Induced Inflammation and Alteration of Redox Potential. Inflammation has long been understood to be an important mechanism underlying the development of ovarian cancer. (61). Inflammation may underlie ovulatory events because an inflammatory reaction is induced during the process of ovulation. Risk factors for ovarian cancer include endometriosis (i.e., ectopic implantation of uterine lining tissue) and pelvic inflammatory diseases (PID). (121). PID was associated with an increased risk of borderline ovarian tumors, particularly among women who had had multiple episodes of pelvic inflammatory disease in a meta-analysis. (122). Consistent with the inflammatory mechanism for ovarian cancer, a prospective nested case-control study from the Prostate, Lung, Colorectal and Ovarian Cancer has also shown that global markers of inflammation such as C-reactive protein, Interleukin L-1 α , Interleukin-8 and Tumor Necrosis Factor- α are associated with a significantly increased in the risk of ovarian cancer. (123). Supportive evidence for the role of inflammation also comes from a meta-analysis showing a decreased risk of ovarian cancer with tubal ligation and hysterectomy. (115). Studies have demonstrated increased risk of ovarian cancer with talcum powder use, and increased risk of ovarian cancer with endometriosis. (87). This risk is 3-fold higher among women exposed to talc who have endometriosis. (48).

Oxidative stress in the form of reactive oxygen species (ROS) and reactive nitrogen species (RNS) plays a role in the pathogenesis, neo-angiogenesis (formation of new vessels) and the dissemination of both early and late stage epithelial ovarian cancer. (124, 125). Epithelial ovarian cancer cells manifest a persistent pro-oxidant state characterized by upregulation of certain key oxidant and downregulation of key antioxidant enzymes, (125) and the presence of oxidative stress triggers cancer cells to favor anaerobic metabolism. Oxidative stress induces phenotypic modification of tumor cells by altering cross-talk between tumor cells and surrounding stroma. Talc can alter this redox state and cause a marked increase in mRNA levels of the prooxidant enzymes, iNOS (nitrous oxide) and MPO (myeloperoxidase) in talc treated ovarian cancer cells as compared to control as early as 24 hours in all doses, (49) as well as a marked decrease in the

mRNA levels of the antioxidant enzymes catalase CAT, glutathione peroxidase (GPX), and superoxide dismutase (SOD3) providing a mechanism by which talcum powder products can induce the development of ovarian cancer.

Cancer antigen [CA-125] a tumor marker secreted by the epithelial cell for monitoring recurrence after treatment of ovarian cancer, was elevated when both normal ovarian cell lines [1.7 +/- 0.5-fold] and ovarian cancer cell lines [1.4±0.5 and 4.4±0.5-fold increase in OV90 and TOV-21G EOC cell lines] were exposed to talc, providing another molecular mechanism by which talc can increase the risk of ovarian cancer. (106).

Talc has been shown to increase proliferation, induce neoplastic transformation and increase ROS generation time-dependently in the normal human epithelial and granulosa ovarian cells and dose-dependently in the polymorphonuclear neutrophils. (71). In studies of human mesothelial cells, both nonfibrous talc and asbestos have shown evidence of genotoxicity. (109) Some have suggested that perineal talc use may also increase risk of ovarian cancer by the induction of anti-MUC1(monoclonal antibodies) possibly via heat-shock protein, (72) although the data are not definitive. (101).

X.IV. Carcinogenicity in Animal Studies. Among animal studies a study among rats demonstrated the development of papillary changes after intrabursal injection of talc. Such papillary changes may be precursors of serous papilloma precursors of epithelial cancers. (107). Another 2-year inhalation study with cosmetic grade talc in rats and mice showed evidence of carcinogenic activity in male (an increased incidence of pheochromocytomas of the adrenal gland) and female (increased incidences of alveolar/bronchiolar adenomas) rats and carcinomas of the lung and pheochromocytomas of the adrenal gland. (108). There was no evidence of carcinogenicity in mice. However, limitations of this study include the lack of a suitable control (e.g. titanium dioxide), alternative explanations of these findings via particle overload, (127) and the fact that ovulatory patterns in rats are not fully applicable to humans.

X.V. Presence of Asbestos and other carcinogens in Talcum powder products. In assessing the biological plausibility of talcum powder products as a cause of ovarian cancer, it is important to consider the constituents of talcum powder products including whether it contains known or suspected carcinogens. The presence of asbestos in talcum powder products can and does provide a plausible biological explanation of the development of ovarian cancer. (36, 37).

Occupational exposure to asbestos is a well-established causal agent for the development of pleural and peritoneal mesothelioma, larynx and ovarian cancer. (36, 127). Talc and asbestos also share chemical similarities. The carcinogenicity of asbestos relies on shape of particles with long thin fibers-such as those occurring in crocidolite asbestos being particularly carcinogenic. Although talc consists primarily of platy talc, it may also contain fibrous talc or other asbestiform minerals. Epithelial ovarian cancer, one most closely associated with talc, histologically most closely resembles mesothelioma providing further evidence of biological mechanisms. As Huncharek notes in their meta-analysis of ovarian cancer associated with talc dusted diaphragm meta-analysis on page 427 "*If one is exposed to a mixture of talc and asbestos, it is reasonable to expect a carcinogen effect as it contains a known carcinogen.*" (13). In addition talcum products contain fibrous talc, heavy metals and fragrance ingredients which are known or suspected carcinogens. (26, 33, 35, 36). Like the presence of Asbestos Fibers, the presence of these known or suspected carcinogens provide a plausible biologic explanation for the increased risk seen in the epidemiologic studies.

XI. ASSESSMENT OF CARCINOGENECITY OF TALC BY THE IARC IN 2006.

The International Agency for Research on Cancer (IARC) expert panel evaluates the carcinogenicity of various products using the following criterion after review of animal studies, experimental studies and epidemiological data. (128). The data is examined to determine whether there is *sufficient evidence, limited evidence, inadequate evidence, or evidence suggesting lack of carcinogenicity* for both cancer in humans and animals, respectively. The mechanistic and other relevant data are examined to *identify established and likely mechanisms and determines whether each mechanism could operate in humans*. The agents are then classified into several groups. Group 1 are agents *carcinogenic* to humans (e.g., asbestos,) (37), Group 2A are agents *probably* carcinogenic to humans, Group 2B *possibly* carcinogenic to humans, Group 3 agents which are *unclassifiable* and Group 4 agents which are *probably not carcinogenic* to humans.

In 2006 IARC concluded that perineal use of talc not containing asbestos or asbestiform fibers was possibly carcinogenic to humans (129) based on *limited evidence in humans for the carcinogenicity of perineal use of talc based body powder and the limited evidence in experimental animals for the carcinogenicity of talc* (93) (Group 2B-b). (38). Although a positive association has been observed between exposure to the agent and cancer for which causal interpretation is considered by the Working Group to be credible, but chance, bias, or confounding could not be ruled out

with reasonable confidence. For purposes of their evaluation, IARC considered 19 case-control studies and 1 cohort study. (14). The Working Group concluded that 8 of the more informative case-control studies (as well as most of the less informative ones) showed a consistent excess risk in the order of 30-60%. The cohort studies neither supported or refuted the evidence from case-control studies.

The IARC assessment was carried under the assumption that talcum powder products did not contain asbestos based on the published findings at the time- an assumption that is not supported by current data. In such a case, talcum powder products would be unequivocally classified as a Group 1 carcinogen like asbestos. Importantly, even absent a finding of asbestos in talcum powder products, the consistent cumulative evidence of peritoneal use of talcum powder products demonstrates an increased risk of ovarian cancer. Several *new systematic reviews based on recently published studies have further added to the accumulating evidence on an increased risk of ovarian cancer with talc use.* (10, 41, 42). *There is now further evidence of exposure response relationships, with measured by an increased risk with increased duration (52, 54) or combination of frequency and duration (48) and the most updated meta-analysis show evidence of duration dose and responsiveness.* (42). Finally, in addition to the epidemiologic evidence there is evidence from toxicology , molecular biology and other mechanistic data which supports my opinions .

XII. COSMETIC EXPERT REVIEW PANEL REPORT.

For the sake of completeness I also reviewed a report on the safety of cosmetic talc by an industry sponsored panel. (130). The panel was primarily composed of dermatologists, with limited expertise in epidemiology and carcinogenicity. The review was carried out under the flawed assumption that cosmetic-grade talc must contain no detectable fibrous, asbestos minerals and thus limited its assessment to animal and clinical studies on talc that did not contain asbestos, and erroneously concluded that there was no evidence of talc migration. As a result of these serious methodologic shortcomings and funding biases it arrived at its erroneous conclusions that talc was safe for use in cosmetics. (130) As discussed above, the findings of this panel have been superseded by findings from several new epidemiological studies, mechanistic studies and systematic reviews which have further added to the accumulating evidence on an increased risk of ovarian cancer with talcum powder product use.

XIII. ASSESSMENT OF CAUSALITY.

While talc is clearly associated with development of ovarian cancer, we must assess whether the observed association leads to an inference about causation. In 1965, in the President's Address to the newly-established Section of Occupational Medicine of the Royal Society of Medicine, Sir Austin Bradford Hill, Professor Emeritus of Medical Statistics at the University of London, attempted to encapsulate the aspects of a causal relationship, as it was understood at the time. (1). As he described them, they were: 1. strength of association, 2. consistency, 3. specificity, 4. temporality, 5. biological gradient, 6. plausibility, 7. coherence, 8. experiment, and 9. analogy. As Professor Hill explained, no aspect alone is either necessary or sufficient: "What I do not believe . . . is that we can usefully lay down some hard-and-fast rules of evidence that *must* be obeyed before we accept cause and effect. None of my nine viewpoints can bring indisputable evidence . . . and none can be required as the *sine qua non*." Further, according to Professor Bradford Hill, these are not the only aspects of causation, but they are informative. It must also always be remembered, as highlighted in a recent statement by the American Statistical Association, that a lack of statistical significance does not imply lack of clinical significance (18) – a point also highlighted by Bradford Hill, who noted that while statistical tests can remind us of the role of chance, "*No formal tests of significance can answer those questions.*"

With respect to the analysis at issue, that is, the association between talcum powder products and ovarian cancer—the results are not only statistically significant, but, as described above, have been replicated by several independent authors in multiple studies across a range of study designs. The cumulative body of evidence was appraised using the Bradford Hill viewpoints. In this regard, and as described in this report, I put significant weight on the Strength, Consistency, Temporality, Biologic Plausibility, and coherence factors and, to a lesser extent, Gradient (Dose-Response) and Analogy data to support my opinion that Talcum Powder Products can cause ovarian cancer. For the reasons stated below, I do not weigh heavily the Experiment and Specificity data in light of the totality of the evidence supporting a causal inference. My assessment is described below.

1. Strength of Association. This aspect of a causal relationship refers to the degree or magnitude of effect to which the exposure is associated with the outcome. (1). According to Bradford Hill, the more likely the exposure is associated with the outcomes, the more likely is it to be causal. As summarized in the meta-analysis in section above, I conclude that the association of talc with

ovarian cancer shows an approximate 30-60% relative increase in the risk of ovarian cancer, after adjustment for multiple confounders of the talc and ovarian cancer relationship. (10, 42). The strength of the association, replicated in multiple studies, provides evidence in support of a causal association. There are several noteworthy examples of well-established causal relationships (e.g. second hand smoking and lung cancer), (131) where the strength of the association is in the order of 20-40%. Such causal associations can have significant effects on the population if a large segment of the population is exposed, as in the case of air pollutants and myocardial infarction, which are significantly associated with an increase in MI risk with small relative risk (carbon monoxide: 1.048; 95% CI, 1.026-1.070; nitrogen dioxide: 1.011; 95% CI, 1.006-1.016; sulfur dioxide: 1.010; 95% CI, 1.003-1.017; PM₁₀: 1.006; 95% CI, 1.002-1.009; and PM_{2.5}: 1.025; 95% CI, 1.015-1.036) but a large population burden because of the large percentage of the population that is exposed. (47). Similarly, 75-100 mg of daily Aspirin has been shown to reduce the risk of cardiovascular events among those weighing 50-69 kg by 25 % [HR 0.75, 95% CI, 0.65-0.5] (132) in an individual participant data meta-analysis of randomized controlled trials. An increment of one serving a day of fruit and vegetables reduced all-cause mortality by 5% (HR 0.95 95% CI: 0.92 - 0.98) in a meta-analysis of cohort studies. (133). As discussed below, I place significant weight on the fact that studies demonstrate a strong association between talcum powder use and ovarian cancer and show consistency of the data.

2. Consistency. This viewpoint assesses whether the finding is repeated in different settings, place and time. (1). As shown in detail above, the direction and strength of association of talc and ovarian cancer is generally consistent across studies, including observational studies of various designs and their meta-analysis, and observational studies. These studies have been conducted in different clinical settings across the world, with different duration of follow up and the cumulative evidence has consistently shown a significantly increased risk of ovarian cancer with the use of talcum powder products. As expected, there are slight differences in the point estimates which reflect differences in study population with nearly all point estimates showing a direction of increased risk of ovarian cancer. The confidence intervals, however, across study designs overlap, indicating consistent results. I place significant weight on the fact that the consistency and strength of the association found in multiple independent studies demonstrates that the association is causative.

3. Specificity. This viewpoint considers whether the outcome of the disease appears to be specific to the exposure, (1) although since the original publication of the Bradford Hill we know

in most cases, absolute specificity for an exposure outcome association is not generally possible for many diseases, particularly cancer, and not required to provide proof of causation. Even the well-established, causal relationship between cigarette smoking and lung cancer or heart disease is not characterized by specificity. Genetic factors may also play a role in the occurrence of ovarian cancer. As discussed above, the occurrence of ovarian cancer is consistently higher among talcum powder users compared to non-users, even after adjusting for several confounders. I placed less weight on absolute specificity of the association between talcum powder exposure and ovarian cancer given the multi-causal nature of the outcome, particularly in light of the strength and consistency of association factors.

4. Temporality. The temporality viewpoint assesses whether the exposure always predates the development of disease. (1). In each of the epidemiologic studies noted above, talc exposure occurred before the diagnosis of ovarian cancer. Although some have argued that some of the symptoms of ovarian cancer (vaginal bleeding, irritation) may lead to talcum powder use, since most ovarian cancers present with abdominal bloating and advanced stages of the disease it is difficult to attribute how development of ovarian cancer would lead to talc use (e.g., reverse causality). I placed significant weight that the exposure to talc preceded the development of ovarian cancer in the studies above.

5. Biological Gradient. This viewpoint assesses whether there is a biological gradient or dose-response effect, (1) recognizing that presence of dose-response is not an absolute requirement for causation. In order to determine dose-response, it is necessary first to determine dose. While the presence of a dose-response relationship supports a causal link, the absence of such a relationship does not preclude a causal association. The causal relationship between asbestos and mesothelioma, which most closely resembles the current scenario is not dose-dependent. Assessing dose-response is challenging in the context of perineal talc use for several reasons: first, unlike, say, birth-control pills, the amount of talc powder product use is not fixed, nor is the number of uses per time (day, week, or month). At a minimum, to assess total dose, it is necessary to acquire information about both duration and frequency. Ascertaining a dose-response relationship with talc and ovarian cancer is particularly challenging given that the risk of ovarian cancer may vary with age, premenopausal and post-menopausal status and the presence of other risk factors. The dose-response depends on both the amount of talc exposure, the frequency of talc uses and the duration. The presence of other risk factors such as post-menopausal status, cancers other than invasive serous ovarian cancer and the “depletion of

susceptibles” over time may make it difficult to ascertain a dose-response relationship. Several studies show evidence of dose-response as measured by an increased risk with increased frequency, (48, 51-55) or increased duration, (52, 54, 56) or a combination of frequency and duration of exposure. (52, 54). Some studies have also shown evidence of increased risk with increased number of lifetime applications, (10, 48, 52) which may be a more accurate measure for long term exposure outcome association mediated via inflammation. The most updated meta-analysis show evidence of duration dose and responsiveness, (42) with risk being higher among those with >3600 applications of talc compared to participants with < 3600 applications, although with overlapping confidence intervals. (42). Based on the above limitations with study design to ascertain dose effect, specificity of dosing of talc and the possibility of threshold effect, I find biological gradient less compelling, but still compelling of my causation analysis than the other Bradford Hill overviews as referenced above.

6. Plausibility. Although this is not a requirement for causation, an association that is biologically plausible is more likely to be causal. (1). While this viewpoint only requires biological mechanism to be *plausible*, which is necessarily limited to the state of biological knowledge at the time of assessment, evidence from the literature described in detail in the section in biological mechanisms shows multiple routes of exposure, multiple pathways and multiple mechanism by which talc can cause ovarian cancer. **Section X** demonstrates how talcum powder products can migrate to the ovaries, induce inflammation, alter redox potential resulting in a pro-oxidant state, (49) and act as a mutagen. (109). As a results of the significant body of evidence that has accumulated on biological mechanisms, I place significant weight on the fact biological plausibility provides evidence in support of the causal role of talc in the development of ovarian cancer and there is a highly biological plausible mechanism here for carcinogenicity which supports my opinion.

7. Coherence. This viewpoint assesses whether the cause-and-effect interpretation of data conflicts with the generally known facts of the natural history and biology of the disease. (1). The evidence on the risk of ovarian cancer with talcum powder exposure is consistent with the nature of the disease. Multiple studies suggest that talcum powder products have biological effects which plausibly explain the occurrence of ovarian cancer. Given the biological mechanisms related to inflammation described above, this mechanism and causal association itself fit easily within the current framework of scientific knowledge about the development of

ovarian cancer mediated by inflammation. I placed a significant weight on the coherence of findings in support of the causal role of talc in the development of ovarian cancer.

8. Experiment. Occasionally, in making a causation assessment, it is possible to appeal to experimental, or semi-experimental, evidence. The definitive experimental evidence would be a placebo controlled randomized trial among patients who are assigned to use talc and others who do not use talc in which the outcome of incident ovarian cancer would be actively ascertained. However, such evidence does not exist and would not be ethical nor feasible with a rare outcome such as ovarian cancer with an incidence of 11.4/100, 000 person-years noted above. While there is no randomized controlled trial here, that is common when dealing with a suspected cancer risk. For instance, there is no randomized controlled trial which supports the causal role of smoking in lung cancer. Such a trial to provide absolute proof of harm, which ignores the body of evidence that has accumulated and places patients at risk for developing ovarian cancer raises significant ethical concerns when data from robust observational studies and their meta-analysis have consistently shown an increased risk of ovarian cancer. In the absence of experimental evidence, this overview is weighted as less important than the other more important viewpoints noted above.

9. Analogy. Asbestos has been shown to cause ovarian cancer which offers an appropriate analogy, (40) but this viewpoint was considered less significant than other viewpoints noted above.

XIV. CONCLUSIONS.

Based on my background, training and education as a physician and epidemiologist, review and analysis of the totality of the evidence, using the weight of evidence analysis, including considering and weighting the Hill viewpoints, as described in this report, it is my opinion stated to a reasonable degree of scientific and medical certainty that peritoneal use of talcum powder products can cause ovarian cancer.

Signed this 16th day of November 2018

A handwritten signature in cursive script, appearing to read "Sonal Singh", written in black ink. The signature is fluid and stylized, with a long horizontal line extending from the end of the name.

Sonal Singh, MD, MPH

References

1. Hill AB. The Environment and Disease: Association or Causation? *Proceedings of the Royal Society of Medicine*. 1965;58(5):295-300.
2. Grosse Y, Loomis D, Lauby-Secretan B, El Ghissassi F, Bouvard V, Benbrahim-Tallaa L, et al. Carcinogenicity of some drugs and herbal products. *Lancet Oncol*. 2013;14(9):807-8.
3. Zorzela L, Loke YK, Ioannidis JP, Golder S, Santaguida P, Altman DG, et al. PRISMA harms checklist: improving harms reporting in systematic reviews. *Bmj*. 2016;352:i157.
4. Deposition of Linda Loretz 562:14-563:6 (October 1, 2018).
5. Deposition of Joshua Muscat 408:21-410:20 (September 25, 2018).
6. Oxford Centre for Evidence-based Medicine – Levels of Evidence (March 2009) [Web]. Oxford, UK: Nuffield Department of Primary Health Care; 2009 [cited 2018 Nov 15]. Available from: <http://www.cebm.net/oxford-centre-evidence-based-medicine-levels-evidence-march-2009/>.
7. Higgins JPT, Thompson SG, Deeks JJ, Altman DG. Measuring inconsistency in meta-analyses. *BMJ*. 2003;327(7414):557-60.
8. Berlin JA, Santanna J, Schmid CH, Szczech LA, Feldman HI. Individual patient- versus group-level data meta-regressions for the investigation of treatment effect modifiers: ecological bias rears its ugly head. *Statistics in medicine*. 2002;21(3):371-87.
9. da Costa BR, Jüni P. Systematic reviews and meta-analyses of randomized trials: principles and pitfalls. *European Heart Journal*. 2014;35(47):3336-45.
10. Terry KL, Karageorgi S, Shvetsov YB, Merritt MA, Lurie G, Thompson PJ, et al. Genital powder use and risk of ovarian cancer: A pooled analysis of 8,525 cases and 9,859 controls. *Cancer Prev Res*. 2013;6(8):811-21.
11. Ioannidis JPA. Integration of evidence from multiple meta-analyses: a primer on umbrella reviews, treatment networks and multiple treatments meta-analyses. *CMAJ : Canadian Medical Association journal = journal de l'Association medicale canadienne*. 2009;181(8):488-93.
12. Shea BJ, Hamel C, Wells GA, Bouter LM, Kristjansson E, Grimshaw J, et al. AMSTAR is a reliable and valid measurement tool to assess the methodological quality of systematic reviews. *Journal of clinical epidemiology*. 2009;62(10):1013-20.
13. Huncharek M, Muscat J, Onitilo A, Kupelnick B. Use of cosmetic talc on contraceptive diaphragms and risk of ovarian cancer: A meta-analysis of nine observational studies. *Eur J Cancer Prev*. 2007;16(5):422-9.
14. Gertig DM, Hunter DJ, Cramer DW, Colditz GA, Speizer FE, Willett WC, et al. Prospective study of talc use and ovarian cancer. *J Natl Cancer Inst*. 2000;92(3):249-52.
15. Ray WA. Evaluating Medication Effects Outside of Clinical Trials: New-User Designs. *AM J EPIDEMIOL*. 2003;158(9):915-20.
16. Hannan MT. Is it a risk factor or confounder? A discussion of selected analytic methods using education as an example. *Arthritis & Rheumatism*. 1996;9(5):413-8.

17. Houghton SC, Reeves KW, Hankinson SE, Crawford L, Lane D, Wactawski-Wende J, et al. Perineal powder use and risk of ovarian cancer. *J Natl Cancer Inst.* 2014;106(9).
18. Wasserstein RL, Lazar NA. The ASA's Statement on p-Values: Context, Process, and Purpose. *The American Statistician.* 2016;70(2):129-33.
19. Gardner MJ, Altman DG. Confidence intervals rather than P values: estimation rather than hypothesis testing. *British Medical Journal (Clinical research ed).* 1986;292(6522):746-50.
20. CDC. United States Cancer Statistics: 1999-2014 Incidence and Mortality Web-based Report 2017 March 4 2018 [cited 2018 March 24]. Available from: www.cdc.gov/uscs.
21. Siegel RL, Miller KD, Jemal A. Cancer statistics, 2017. *CA: A Cancer Journal for Clinicians.* 2017;67(1):7-30.
22. Rohl AN, Langer AM, Selikoff IJ, Tordini A, Klimentidis R, Bowes DR, et al. Consumer talcums and powders: mineral and chemical characterization. *Journal of toxicology and environmental health.* 1976;2(2):255-84.
23. Crowley, M. Report of Michael M. Crowley, PhD. Regarding the Fragrance Chemical Constituents in Johnson & Johnson Talcum Powder Products (November 12, 2018).
24. Rohl AN. Asbestos in talc. *Environmental health perspectives.* 1974;9:129-32.
25. Paoletti L, Caiazza S, Donelli G, Pocchiari F. Evaluation by electron microscopy techniques of asbestos contamination in industrial, cosmetic, and pharmaceutical talcs. *Regulatory toxicology and pharmacology : RTP.* 1984;4(3):222-35.
26. Blount AM. Amphibole content of cosmetic and pharmaceutical talcs. *Environmental health perspectives.* 1991;94:225-30.
27. Deposition of Alice M. Blount, 105:21-106:6 (April 13, 2018).
28. Food and Drug Administration; 2018 [updated March 12 2018; cited 2018 November 15]. Available from: <https://www.fda.gov/Cosmetics/ProductsIngredients/Ingredients/ucm293184.htm>.
29. JNJ000637879-JNJ000637881.
30. Longo, et. al. Analysis of Johnson & Johnson Baby Powder & Valiant Shower to Shower Talc Products for Amphibole (Tremolite) Asbestos (August 2, 2017).
31. Longo, et al. MAS Project # 14-1683 Johnson's Baby Powder Sample Set (April 28, 2017).
32. Longo, et al. TEM Analysis of Historical 1978 Johnson's Baby Powder Sample for Asbestos (February 16, 2018).
33. Deposition of John Hopkins, Exhibit 28 (November 5, 2018).
34. Longo, et al. *In re: Talcum Power Prod. Liab. Litig.*, MDL No. 2738 (Nov. 14, 2018).
35. Deposition of Julie Pier, Exhibit 47 (September 13, 2018).
36. International Agency for Research in Cancer Monographs on the Evaluation of Carcinogenic Risks to Humans: Volume 100C Arsenic, Metals, Fibers and Dusts (2012)
37. Straif K, Benbrahim-Tallaa L, Baan R, Grosse Y, Secretan B, El Ghissassi F, et al. A review of human carcinogens. Part C: metals, arsenic, dusts, and fibres. *The Lancet Oncology.* 2009;10(5):453-4.

38. World Health Organization. International Agency for Research on Cancer. IARC Monographs on the Evaluation of Carcinogenic Risks to Humans Carbon Black, Titanium Dioxide, and Talc Lyon 2010
39. Gross AJ, Berg PH. A meta-analytical approach examining the potential relationship between talc exposure and ovarian cancer. *J EXPOS ANAL ENVIRON EPIDEMIOL*. 1995;5(2):181-95.
40. Huncharek M, Geschwind JF, Kupelnick B. Perineal application of cosmetic talc and risk of invasive epithelial ovarian cancer: A meta-analysis of 11, 933 subjects from sixteen observational studies. *Anticancer Res*. 2003;23(2 C):1955-60.
41. Berge W, Mundt K, Luu H, Boffetta P. Genital use of talc and risk of ovarian cancer: a meta-analysis. *Eur J Cancer Prev*. 2018; 27(3): 248-257.
42. Penninkilampi R, Eslick GD. Perineal Talc Use and Ovarian Cancer: A Systematic Review and Meta-Analysis. *Epidemiology*. 2018;29(1):41-9.
43. Lane PW, Higgins JP, Anagnostelis B, Anzures-Cabrera J, Baker NF, Cappelleri JC, et al. Methodological quality of meta-analyses: matched-pairs comparison over time and between industry-sponsored and academic-sponsored reports. *Research synthesis methods*. 2013;4(4):342-50.
44. Hackshaw AK, Law MR, Wald NJ. The accumulated evidence on lung cancer and environmental tobacco smoke. *Bmj*. 1997;315(7114):980-8.
45. Kim S, Ko Y, Lee HJ, Lim JE. Menopausal hormone therapy and the risk of breast cancer by histological type and race: a meta-analysis of randomized controlled trials and cohort studies. *Breast cancer research and treatment*. 2018;170(3):667-75.
46. Hamra GB, Guha N, Cohen A, Laden F, Raaschou-Nielsen O, Samet JM, et al. Outdoor particulate matter exposure and lung cancer: a systematic review and meta-analysis. *Environmental health perspectives*. 2014;122(9):906-11.
47. Mustafic H, Jabre P, Caussin C, Murad MH, Escolano S, Tafflet M, et al. Main air pollutants and myocardial infarction: a systematic review and meta-analysis. *JAMA*. 2012;307(7):713-21.
48. Wu AH, Pearce CL, Tseng CC, Templeman C, Pike MC. Markers of inflammation and risk of ovarian cancer in Los Angeles county. *INT J CANCER*. 2009;124(6):1409-15.
49. Fletcher NM, Memaj I, Saed GM. Talcum Powder Enhances Oxidative Stress in Ovarian Cancer Cells, *Reproductive Sciences*. 2018;25(1_suppl):1A-54A.
50. Ioannidis JP. Exposure-wide epidemiology: revisiting Bradford Hill. *Statistics in medicine*. 2016;35(11):1749-62.
51. Booth M, Beral V, Smith P. Risk factors for ovarian cancer: a case-control study. *British journal of cancer*. 1989;60(4):592-8.
52. Schildkraut JM, Abbott SE, Alberg AJ, Bandera EV, Barnholtz-Sloan JS, Bondy ML, et al. Association between Body Powder Use and Ovarian Cancer: the African American Cancer Epidemiology Study (AACES). *Cancer Epidemiology Biomarkers & Prevention*. 2016.

53. Wu AH, Pearce CL, Tseng CC, Pike MC. African Americans and hispanics remain at lower risk of ovarian cancer than non-hispanic whites after considering nongenetic risk factors and oophorectomy rates. *Cancer Epidemiol Biomarkers Prev.* 2015;24(7):1094-100.
54. Cramer DW, Vitonis AF, Terry KL, Welch WR, Titus LJ. The association between talc use and ovarian cancer a retrospective case-control study in two us states. *Epidemiology.* 2016;27(3):334-46.
55. Gates MA, Tworoger SS, Terry KL, Titus-Ernstoff L, Rosner B, De Vivo I, et al. Talc use, variants of the GSTM1, GSTT1, and NAT2 genes, and risk of epithelial ovarian cancer. *Cancer Epidemiol Biomarkers Prev.* 2008;17(9):2436-44.
56. Chang S, Risch HA. Perineal talc exposure and risk of ovarian carcinoma. *CANCER.* 1997;79(12):2396-401.
57. Cramer DW, Liberman RF, Titus-Ernstoff L, Welch WR, Greenberg ER, Baron JA, et al. Genital talc exposure and risk of ovarian cancer. *INT J CANCER.* 1999;81(3):351-6.
58. Whittemore AS, Wu ML, Paffenbarger RS, Sarles DL, Kampert JB, Grosser S, et al. Personal and environmental characteristics related to epithelial ovarian cancer: II. Exposures to talcum powder, tobacco, alcohol, and coffee. *AM J EPIDEMIOL.* 1988;128(6):1228-40.
59. Mills PK, Riordan DG, Cress RD, Young HA. Perineal talc exposure and epithelial ovarian cancer risk in the central valley of California. *INT J CANCER.* 2004;112(3):458-64.
60. Rosenblatt KA, Weiss NS, Cushing-Haugen KL, Wicklund KG, Rossing MA. Genital powder exposure and the risk of epithelial ovarian cancer. *Cancer Causes Control.* 2011;22(5):737-42.
61. Ness RB, Cottreau C. Possible role of ovarian epithelial inflammation in ovarian cancer. *J Natl Cancer Inst.* 1999;91(17):1459-67.
62. Green A, Purdie D, Bain C, Siskind V, Russell P, Quinn M, et al. Tubal sterilisation, hysterectomy and decreased risk of ovarian cancer. Survey of Women's Health Study Group. *Int J Cancer.* 1997;71(6):948-51.
63. JNJ000460665-JNJ000460673.
64. Heller DS, Westhoff C, Gordon RE, Katz N. The relationship between perineal cosmetic talc usage and ovarian talc particle burden. *AM J OBSTET GYNECOL.* 1996;174(5):1507-10.
65. Henderson WJ, Joslin CA, Turnbull AC, Griffiths K. Talc and carcinoma of the ovary and cervix. *The Journal of obstetrics and gynaecology of the British Commonwealth.* 1971;78(3):266-72.
66. Cramer DW, Welch WR, Berkowitz RS, Godleski JJ. Presence of talc in pelvic lymph nodes of a woman with ovarian cancer and long-term genital exposure to cosmetic talc. *Obstet Gynecol.* 2007;110(2 II):498-501.
67. Wehner AP, Weller RE, Lepel EA. On talc translocation from the vagina to the oviducts and beyond. *Food and chemical toxicology : an international journal published for the British Industrial Biological Research Association.* 1986;24(4):329-38.
68. Sjosten AC, Ellis H, Edelstam GA. Retrograde migration of glove powder in the human female genital tract. *Human reproduction (Oxford, England).* 2004;19(4):991-5.
69. FDA response to Citizen's Petition (2014), JNJ000489048- JNJ000489054.

70. Longo, et al. Below the Waist Application of Johnson & Johnson Baby Powder (September 2017).
71. Buz'Zard AR, Lau BHS. Pycnogenol® reduces talc-induced neoplastic transformation in human ovarian cell cultures. *Phytother Res.* 2007;21(6):579-86.
72. Cramer DW, Titus-Ernstoff L, McKolanis JR, Welch WR, Vitonis AF, Berkowitz RS, et al. Conditions associated with antibodies against the tumor-associated antigen MUC1 and their relationship to risk for ovarian cancer. *Cancer Epidemiol Biomarkers Prev.* 2005;14(5):1125-31.
73. Langseth H, Hankinson SE, Siemiatycki J, Weiderpasse E. Perineal use of talc and risk of ovarian cancer. *J Epidemiol Community Health.* 2008;62(4):358-60.
74. Muscat JE, Huncharek MS. Perineal Talc Use and Ovarian Cancer: A Critical Review. *European journal of cancer prevention : the official journal of the European Cancer Prevention Organisation (ECP).* 2008;17(2):139-46.
75. Cramer DW, Welch WR, Scully RE, Wojciechowski CA. Ovarian cancer and talc. A case-control study. *CANCER.* 1982;50(2):372-6.
76. Hartge P, Hoover R, Leshner LP, McGowan L. Talc and Ovarian Cancer. *JAMA.* 1983;250(14):1844.
77. Harlow BL, Weiss NS. A case-control study of borderline ovarian tumors: the influence of perineal exposure to talc. *Am J Epidemiol.* 1989;130(2):390-4.
78. Chen Y, Wu PC, Lang JH, Ge WJ, Hartge P, Brinton LA. Risk factors for epithelial ovarian cancer in Beijing, China. *Int J Epidemiol.* 1992;21(1):23-9.
79. Harlow BL, Cramer DW, Bell DA, Welch WR. Perineal exposure to talc and ovarian cancer risk. *Obstet Gynecol.* 1992;80(1):19-26.
80. Rosenblatt KA, Szklo M, Rosenshein NB. Mineral fiber exposure and the development of ovarian cancer. *Gynecol Oncol.* 1992;45(1):20-5.
81. Tzonou A, Polychronopoulou A, Hsieh CC, Trichopoulos D, Rebelakos A, Karakatsani A. Hair dyes, analgesics, tranquilizers and perineal talc application as risk factors for ovarian cancer. *INT J CANCER.* 1993;55(3):408-10.
82. Purdie D, Green A, Bain C, Siskind V, Ward B, Hacker N, et al. Reproductive and other factors and risk of epithelial ovarian cancer: an Australian case-control study. *Survey of Women's Health Study Group. Int J Cancer.* 1995;62(6):678-84.
83. Shushan A, Paltiel O, Iscovich J, Elchalal U, Peretz T, Schenker JG. Human menopausal gonadotropin and the risk of epithelial ovarian cancer *. *FERTIL STERIL.* 1996;65(1):13-8.
84. Cook LS, Kamb ML, Weiss NS. Perineal powder exposure and the risk of ovarian cancer. *AM J EPIDEMIOL.* 1997;145(5):459-65.
85. Godard B, Foulkes WD, Provencher D, Brunet J-S, Tonin PN, Mes-Masson A-M, et al. Risk factors for familial and sporadic ovarian cancer among French Canadians: A case-control study. *AM J OBSTET GYNECOL.* 1998;179(2):403-10.

86. Wong C, Hempling RE, Piver MS, Natarajan N, Mettlin CJ. Perineal talc exposure and subsequent epithelial ovarian cancer: A case- control study. *Obstet Gynecol.* 1999;93(3):372-6.
87. Ness RB, Grisso JA, Cottreau C, Klapper J, Vergona R, Wheeler JE, et al. Factors related to inflammation of the ovarian epithelium and risk of ovarian cancer. *Epidemiology.* 2000;11(2):111-7.
88. Langseth H, Kjaerheim K. Ovarian cancer and occupational exposure among pulp and paper employees in Norway. *Scandinavian journal of work, environment & health.* 2004;30(5):356-61.
89. Merritt MA, Green AC, Nagle CM, Webb PM, Bowtell D, Chenevix-Trench G, et al. Talcum powder, chronic pelvic inflammation and NSAIDs in relation to risk of epithelial ovarian cancer. *INT J CANCER.* 2008;122(1):170-6.
90. Moorman PG, Palmieri RT, Akushevich L, Berchuck A, Schildkraut JM. Ovarian Cancer Risk Factors in African-American and White Women. *AM J EPIDEMIOL.* 2009;170(5):598-606.
91. Kurta ML, Moysich KB, Weissfeld JL, Youk AO, Bunker CH, Edwards RP, et al. Use of fertility drugs and risk of ovarian cancer: Results from a U.S.-based case-control study. *Cancer Epidemiol Biomarkers Prev.* 2012;21(8):1282-92.
92. Gates MA, Rosner BA, Hecht JL, Tworoger SS. Risk factors for epithelial ovarian cancer by histologic subtype. *Am J Epidemiol.* 2010;171(1):45-53.
93. Gonzalez NL, O'Brien KM, D'Aloisio AA, Sandler DP, Weinberg CR. Douching, talc use, and risk of ovarian cancer. *Epidemiology.* 2016;27(6):797-802.
94. Henderson WJ, Hamilton TC, Griffiths K. Talc in normal and malignant ovarian tissue. *Lancet.* 1979;1(8114):499.
95. Wehner AP, Hall AS, Weller RE, Lepel EA, Schirmer RE. Do particles translocate from the vagina to the oviducts and beyond? *Food and chemical toxicology : an international journal published for the British Industrial Biological Research Association.* 1985;23(3):367-72.
96. Hartge P, Stewart P. Occupation and ovarian cancer: A case-control study in the Washington, DC, metropolitan area, 1978–1981. *J Occup Med.* 1994;36(8):924-7.
97. Boorman GA, Seely JC. The lack of an ovarian effect of lifetime talc exposure in F344/N rats and B6C3F1 mice. *REGUL TOXICOL PHARMACOL.* 1995;21(2):242-3.
98. Cramer DW, Xu H. Epidemiologic evidence for uterine growth factors in the pathogenesis of ovarian cancer. *Ann Epidemiol.* 1995;5(4):310-4.
99. Heller DS, Gordon RE, Westhoff C, Gerber S. Asbestos exposure and ovarian fiber burden. *AM J IND MED.* 1996;29(5):435-9.
100. Rosenblatt KA, Mathews WA, Daling JR, Voigt LF, Malone K. Characteristics of women who use perineal powders. *Obstet Gynecol.* 1998;92(5):753-6.
101. Muscat J, Huncharek M, Cramer DW. Talc and anti-MUC1 antibodies. *Cancer Epidemiol Biomarkers Prev.* 2005 Nov;14(11 Pt 1):2679; author reply.
102. Keskin N, Teksen YA, Ongun EG, Özay Y, Saygılı H. Does long-term talc exposure have a carcinogenic effect on the female genital system of rats? An experimental pilot study. *Arch Gynecol Obstet.* 2009;280(6):925-31.

103. Karageorgi S, Gates MA, Hankinson SE, De Vivo I. Perineal use of talcum powder and endometrial cancer risk. *Cancer Epidemiol Biomarkers Prev.* 2010;19(5):1269-75.
104. Gordon RE, Fitzgerald S, Millette J. Asbestos in commercial cosmetic talcum powder as a cause of mesothelioma in women. *International journal of occupational and environmental health.* 2014;20(4):318-32.
105. Pierce JS, Riordan AS, Miller EW, Gaffney SH, Hollins DM. Evaluation of the presence of asbestos in cosmetic talcum products. *Inhalation toxicology.* 2017;29(10):443-56.
106. Nicole M Fletcher, Ira Memaj, Ghassan M Saed. Talcum Powder Enhances Cancer Antigen 125 levels in Ovarian Cancer Cells, Society for Reproductive Investigation 65th Annual Scientific Meeting, LB-044. 2018.
107. Hamilton TC, Fox H, Buckley CH, Henderson WJ, Griffiths K. Effects of talc on the rat ovary. *British journal of experimental pathology.* 1984;65(1):101-6.
108. NTP Toxicology and Carcinogenesis Studies of Talc (CAS No. 14807-96-6)(Non-Asbestiform) in F344/N Rats and B6C3F1 Mice (Inhalation Studies). National Toxicology Program technical report series. 1993;421:1-287.
109. Shukla A, MacPherson MB, Hillegass J, Ramos-Nino ME, Alexeeva V, Vacek PM, et al. Alterations in gene expression in human mesothelial cells correlate with mineral pathogenicity. *American journal of respiratory cell and molecular biology.* 2009;41(1):114-23.
110. Liberati A, Altman DG, Tetzlaff J, Mulrow C, Gøtzsche PC, Ioannidis JPA, et al. The PRISMA Statement for Reporting Systematic Reviews and Meta-Analyses of Studies That Evaluate Health Care Interventions: Explanation and Elaboration. *PLOS Medicine.* 2009;6(7):e1000100.
111. Berretta M, Micek A, Lafranconi A, Rossetti S, Di Francia R, De Paoli P, et al. Coffee consumption is not associated with ovarian cancer risk: a dose-response meta-analysis of prospective cohort studies. *Oncotarget.* 2018;9(29):20807-15.
112. Ong JS, Hwang LD, Cuellar-Partida G, Martin NG, Chenevix-Trench G, Quinn MCJ, et al. Assessment of moderate coffee consumption and risk of epithelial ovarian cancer: a Mendelian randomization study. *Int J Epidemiol.* 2018;47(2):450-9.
113. Cramer DW, Piver MS. Perineal talc exposure and subsequent epithelial ovarian cancer: A case-control study [4] (multiple letters). *Obstet Gynecol.* 1999;94(1):160-1.
114. Giovannucci E, Stampfer MJ, Colditz GA, Manson JE, Rosner BA, Longnecker MP, et al. Recall and selection bias in reporting past alcohol consumption among breast cancer cases. *Cancer Causes & Control.* 1993;4(5):441-8.
115. Rice MS, Murphy MA, Tworoger SS. Tubal ligation, hysterectomy and ovarian cancer: A meta-analysis. *Journal of ovarian research.* 2012;5(1):13-.
116. IMERYS137677.
117. Zazenski R, Ashton WH, Briggs D, Chudkowski M, Kelse JW, MacEachern L, et al. Talc: occurrence, characterization, and consumer applications. *Regulatory toxicology and pharmacology : RTP.* 1995;21(2):218-29.

118. Klaassen CD, Watkins JB. Casarett & Doull's Essentials of Toxicology, Third Edition. Leikauf G.D., editor. New York: McGraw-Hill Education; 2015.
119. Suzuki Y, Kohyama N. Translocation of inhaled asbestos fibers from the lung to other tissues. *Am J Ind Med.* 1991;19(6):701-4.
120. Bunderson-Schelman M, Pfau JC, Crouch R, Holian A. Nonpulmonary outcomes of asbestos exposure. *Journal of toxicology and environmental health Part B, Critical reviews.* 2011;14(1-4):122-52.
121. Kelly MG, Pejovic T, Nezhat FR. What is the relationship between endometriosis and epithelial ovarian cancer? *CME J Gynecol Oncol.* 2003;8(1):41-7.
122. Rasmussen CB, Kjaer SK, Albieri V, Bandera EV, Doherty JA, Hogdall E, et al. Pelvic Inflammatory Disease and the Risk of Ovarian Cancer and Borderline Ovarian Tumors: A Pooled Analysis of 13 Case-Control Studies. *Am J Epidemiol.* 2017;185(1):8-20.
123. Trabert B, Pinto L, Hartge P, Kemp T, Black A, Sherman ME, et al. Pre-diagnostic serum levels of inflammation markers and risk of ovarian cancer in the Prostate, Lung, Colorectal and Ovarian Cancer (PLCO) Screening Trial. *Gynecol Oncol.* 2014;135(2):297-304.
124. Ghassan M Saed, Robert T Moriss and Nicole Fletecher. New Insights into the Pathogenesis of Ovarian Cancer: Oxidative Stress. 2018 October 24 2018. Available from <https://www.intechopen.com/books/ovarian-cancer-from-pathogenesis-to-treatment>
125. Saed GM, Diamond MP, Fletcher NM. Updates of the role of oxidative stress in the pathogenesis of ovarian cancer. *Gynecol Oncol.* 2017;145(3):595-602.
126. Oberdorster G. The NTP Talc Inhalation Study: A Critical Appraisal Focused on Lung Particle Overload. *REGUL TOXICOL PHARMACOL.* 1995;21(2):233-41.
127. Camargo MC, Stayner LT, Straif K, Reina M, Al-Alem U, Demers PA, et al. Occupational exposure to asbestos and ovarian cancer: a meta-analysis. *Environmental health perspectives.* 2011;119(9):1211-7.
128. WHO IARC. Preamble. [Web]. Lyon, France: IARC; 2006 [updated September 4 2015; cited 2018 Nov 10]. Available from: <https://monographs.iarc.fr/preamble-to-the-iarc-monographs-amended-january-2006/>.
129. Baan R, Straif K, Grosse Y, Secretan B, El Ghissassi F, Coglian V. Carcinogenicity of carbon black, titanium dioxide, and talc. *The Lancet Oncology.* 7(4):295-6.
130. Fiume M, Ivan B, Wilma FB, Donald VB, Ronald AH, Curtis DK, et al. Safety Assessment of Talc as Used in Cosmetics. *International Journal of Toxicology.* 2015;34(1_suppl):66S-129S
131. Reports of the Surgeon General. The Health Consequences of Involuntary Exposure to Tobacco Smoke: A Report of the Surgeon General. Atlanta (GA): Centers for Disease Control and Prevention (US); 2006.
132. Rothwell PM, Cook NR, Gaziano JM, Price JF, Belch JFF, Roncaglioni MC, et al. Effects of aspirin on risks of vascular events and cancer according to bodyweight and dose: analysis of individual patient data from randomised trials. *Lancet.* 2018;392(10145):387-99.

133. Wang X, Ouyang Y, Liu J, Zhu M, Zhao G, Bao W, et al. Fruit and vegetable consumption and mortality from all causes, cardiovascular disease, and cancer: systematic review and dose-response meta-analysis of prospective cohort studies. *BMJ : British Medical Journal*. 2014;349.

Table 1. AMSTAR (Assessing the Methodologic Quality of Systematic Reviews) Rating of Systematic Reviews and/or Meta-analysis of Genital Talc use and Ovarian Cancer									
Criterion	Harlow et al 1992 ¹	Gross and Berg et al 1995 ²	Cramer et al 1999 ³	Huncharek et al 2003 ⁴	Langseth et al 2007 ⁵	Terry et al 2013 # ⁶	Berge et al 2018 ⁷	Penninkilampi and Eslick 2018. ⁸	Huncharek et al 2007 ^{9*}
<i>A priori design</i>	UA	Y	N	UA	UA	Y	Y	Y	UA
<i>Duplicate study selection & extraction</i>	N	N	N	Y	N	NA	Y	Y	Y
<i>Comprehensive search</i>	N	N	N	UA	N	NA	Y	Y	N
<i>Status of publication used as criterion</i>	UA	N	UA	Y	UA	NA	Y	N	Y
<i>List of included & excluded studies</i>	N	N	N	N	N	Y	Y	Y	N
<i>Characteristics of studies provided</i>	N	Y	N	N	N	Y	Y	Y	Y
<i>Scientific quality of studies addressed</i>	N	UA	N	N	Y	Y	Y	Y	N
<i>Scientific quality of studies used in formulating conclusions</i>	N	Y	UA	N	Y	Y	Y	Y	N
<i>Methods of combining studies appropriate</i>	N	Y	Y	Y	Y	Y	Y	Y	N
<i>Likelihood of publication bias addressed</i>	N	N	N	N	N	NA	Y	Y	N
<i>Conflict of interest included</i>	Y	Y	Y	UA@	Y	Y	Y	Y	UA@

*Meta-analysis by Huncharek et al in 2007 et al evaluated only talc on contraceptive diaphragms

Terry et al 2013 conducted an individual participant data pooled analysis so several items for systematic review NA

@ Incomplete financial disclosures of role of sponsor in meta-analysis

Y= Yes N= No; NA= Not applicable; UA : Unable to answer

1. Harlow BL, Cramer DW, Bell DA, et al. Perineal exposure to talc and ovarian cancer risk. *Obstet Gynecol* 1992;80(1):19-26.
2. Gross AJ, Berg PH. A meta-analytical approach examining the potential relationship between talc exposure and ovarian cancer. *J EXPOS ANAL ENVIRON EPIDEMIOL* 1995;5(2):181-95.
3. Cramer DW, Liberman RF, Titus-Ernstoff L, et al. Genital talc exposure and risk of ovarian cancer. *INT J CANCER* 1999;81(3):351-56.
4. Huncharek M, Geschwind JF, Kupelnick B. Perineal application of cosmetic talc and risk of invasive epithelial ovarian cancer: A meta-analysis of 11, 933 subjects from sixteen observational studies. *Anticancer Res* 2003;23(2 C):1955-60.
5. Langseth H, Hankinson SE, Siemiatycki J, et al. Perineal use of talc and risk of ovarian cancer. *J Epidemiol Community Health* 2008;62(4):358-60. doi: 10.1136/jech.2006.047894
6. Terry KL, Karageorgi S, Shvetsov YB, et al. Genital powder use and risk of ovarian cancer: A pooled analysis of 8,525 cases and 9,859 controls. *Cancer Prev Res* 2013;6(8):811-21. doi: 10.1158/1940-6207.CAPR-13-0037
7. Berge W, Mundt K, Luu H, Boffetta P. Genital use of talc and risk of ovarian cancer: a meta-analysis. *EurJ Cancer Prev*. 2018; 27(3): 248-257
8. Penninkilampi R, Eslick GD. Perineal Talc Use and Ovarian Cancer: A Systematic Review and Meta-Analysis. *Epidemiology* 2018;29(1):41-49. doi: 10.1097/ede.0000000000000745 [published Online First: 2017/09/02]
9. Huncharek M, Muscat J, Onitilo A, et al. Use of cosmetic talc on contraceptive diaphragms and risk of ovarian cancer: A meta-analysis of nine observational studies. *EurJ Cancer Prev* 2007;16(5):422-29. doi: 10.1097/01.cej.0000236257.03394.4a

Additional Materials and Data Considered

1. Adler RH, Rappole BW. Recurrent malignant pleural effusions and talc powder aerosol treatment. *Surgery*. 1967;62(6):1000-6.
2. Adler RH, Sayek I. Treatment of malignant pleural effusion: a method using tube thoracostomy and talc. *The Annals of thoracic surgery*. 1976;22(1):8-15.
3. Ainsworth S. Not safe for babies' bottom? The practising midwife. 2009;12(4):42.
4. Baker TR, Piver MS. Etiology, biology, and epidemiology of ovarian cancer. *Semin Surg Oncol*. 1994;10(4):242-8.
5. Balkwill, Mantovani. Inflammation and Cancer: Back to Virchow? *Lancet*. 2011; 357(9255):539-45.
6. Barbetakis N, Asteriou C, Papadopoulou F, Samanidis G, Paliouras D, Kleontas A, et al. Early and late morbidity and mortality and life expectancy following thoracoscopic talc insufflation for control of malignant pleural effusions: A review of 400 cases. *J Cardiothoracic Surg*. 2010;5(1).
7. Begg, March. Cause and Association: missing the forest for the trees. *American Journal of Public Health (AJPH)*. 2018; Vol. 108, No. 5.
8. Bernal LS, Ramos CLM. Risk factors for ovary carcinoma. *REV INST NAC CANCEROL*. 1996;42(4):213-20.
9. Berge, Wera, Kenneth Mundt, Hung Luu, and Paolo Boffetta. 2017. "Genital Use of Talc and Risk of Ovarian Cancer: A Meta-Analysis." *European Journal of Cancer Prevention*, January, 1. <https://doi.org/10.1097/CEJ.0000000000000340>.
10. Bielsa S, Hernández P, Rodríguez-Panadero F, Taberner T, Salud A, Porcel JM. Tumor type influences the effectiveness of pleurodesis in malignant effusions. *Lung*. 2011;189(2):151-5.
11. Boente MP, Godwin AK, Hogan WM. Screening, imaging, and early diagnosis of ovarian cancer. *CLIN OBSTET GYNECOL*. 1994;37(2):377-91.
12. Bondoc AYP, Bach PB, Sklarin NT, Vander Els NJ. Arterial Desaturation Syndrome Following Pleurodesis with Talc Slurry: Incidence, Clinical Features, and Outcome. *Cancer Invest*. 2003;21(6):848-54.
13. Bronner GM, Baas P, Beijnen JH. Pleurodesis in malignant pleural effusions. *NED TIJDSCHR GENEESKD*. 1997;141(38):1810-4.
14. Bulbulyan MA, Ilychova SA, Zahm SH, Astashevsky SV, Zaridze DG. Cancer mortality among women in the Russian printing industry. *AM J IND MED*. 1999;36(1):166-71.
15. Carr CJ. Talc: Consumer uses and health perspectives. *Proceedings of a Workshop*. Bethesda, Maryland, January 31-February 1, 1994 . *Regulatory Toxicology and Pharmacology*: RTP. 1995; 21(2):211-60.
16. Chang, Tu, Chen, Yang. Occupational exposure to talc increases the risk of lung cancer: a meta-analysis of occupational cohort studies. *Canadian Respiratory Journal*. 2017; 2017:1270608.
17. Chi DS, Abu-Rustum NR, Sonoda Y, Chen SWW, Flores RM, Downey R, et al. The benefit of video-assisted thoracoscopic surgery before planned abdominal exploration in

patients with suspected advanced ovarian cancer and moderate to large pleural effusions. *Gynecol Oncol.* 2004;94(2):307-11.

18. Cook LS. No significant association was found between perineal talcum powder use and epithelial ovarian cancer. *Evid-based Obstet Gynecol.* 2000;2(2):53-4.

19. Coussens, L.M. and Z Werb. Inflammation and cancer. *Nature.* 2002; 420(6917):860-867.

20. Cralley L, M Key, D Groth, W Lainhart, R Ligo. Fibrous and mineral content of cosmetic talcum products. *American Industrial Hygiene Association Journal.* 1968; 29(4):350-354.

21. Cramer DW, Finn OJ. Epidemiologic perspective on immune-surveillance in cancer. *Curr Opin Immunol.* 2011;23(2):265-71.

22. Cramer DW. The Epidemiology of Endometrial and Ovarian Cancer. *Hematol Oncol Clin North Am.* 2012;26(1):1-12.

23. Critchley LA, Au HK, Yim AP. Reexpansion pulmonary edema occurring after thoracoscopic drainage of a pleural effusion. *Journal of clinical anesthesia.* 1996;8(7):591-4.

24. Crusz, Balkwill . Inflammation and cancer: advances and new agents. *Nature reviews. Clinical Oncology.* 2015; 12(10):584-96.

25. Curie P, Sussmann M, Treisser A, Renaud R. Epidemiologic factors in ovarian carcinoma. *REV FR GYNECOL OBSTET.* 1985;80(6):379-82.

26. Current Intelligence Bulletin 62(Rev/4/2011) – Asbestos fibers and other elongate mineral particles: state of the science and roadmap for research. National Institute for Occupational Safety and Health (NIOSH) DHSS. (NIOSH) publication No. 2011-159.

27. Dalley VM. The role of radiotherapy and chemotherapy in the treatment of cancer of the ovary. *Int J Radiat Oncol Biol Phys.* 1982;8(2):251-5.

28. Daly M, Orams GI. Epidemiology and risk assessment for ovarian cancer. *Semin Oncol.* 1998;25(3):255-64.

29. Dement, Schuler, Zumwalde. “fiber exposure during use of baby powders”. National Institute for Occupational Safety and Health, IWS. 1972; 36-6:1-13.

30. Dial J, Marzusch K. Ovarian surface epithelium and human ovarian cancer. *Gynecol Obstet Invest.* 1993;35(3):129-35.

31. Dietl J, Buchholz F, Stoll P. The ovarian surface epithelium and its histogenetic relation to ovarian carcinoma. *GEBURTSHILFE FRAUENHEILKD.* 1986;46(9):561-6.

32. Eberl, George, May Jr., Henderson. Comparative evaluation of the effects of talcum and new absorbable substitute of surgical gloves. *The American Journal of Surgery.* 1948; Vol. 75, Issue 3, Pgs. 493-497.

33. Egli G, M. Newton. The transport of carbon particles in the human female reproductive tract, *Fertility and Sterility* 1961;12(April):151-55.

34. Elmasry K, Gayther SA. Ovarian cancer aetiology: Facts and fiction. *J Fam Plann Reprod Health Care.* 2006;32(2):82-6.

35. Eltabbakh GH, Piver MS, Natarajan N, Mettlin CJ. Epidemiologic differences between women with extraovarian primary peritoneal carcinoma and women with epithelial ovarian cancer. *Obstet Gynecol.* 1998;91(2):254-9.
36. Erickson KV, Yost M, Bynoe R, Almond C, Nottingham J. Primary treatment of malignant pleural effusions: video-assisted thoracoscopic surgery poudrage versus tube thoracostomy. *The American surgeon.* 2002;68(11):955-9; discussion 9-60.
37. Fedak, Kristen M., Autumn Bernal, Zachary A. Capshaw, and Sherilyn Gross. 2015. "Applying the Bradford Hill Criteria in the 21st Century: How Data Integration Has Changed Causal Inference in Molecular Epidemiology." *Emerging Themes in Epidemiology* 12 (14). <https://doi.org/10.1186/s12982-015-0037-4>.
38. Federal Judicial Center and National Research Council of the National Academies (2011). *Reference Manual on Scientific Evidence, Third Edition.* Washington, D.C., The National Academies Press.
39. Fernandes, Cobucci, Jatoba, Fernandes, deAzevedo, De Arujo. The role of the mediators of inflammation in cancer development. *Pathology Oncology Research: POR.* 2015; 21(3):527-34.
40. Fletcher N, J Belotte, M Saed, Memaj, M Diamond, R Morris, G Saed . Talcum Specific point mutations in key redox enzymes are associated with chemoresistance in epithelial ovarian cancer. *Free Radical Biology and Medicine.* 2016; 102:122-132.
41. Filosso PL, Sandri A, Felletti G, Ruffini E, Lausi PO, Oliaro A. Preliminary results of a new small-bore percutaneous pleural catheter used for treatment of malignant pleural effusions in ECOG PS 3-4 patients. *Eur J Surg Oncol.* 2011;37(12):1093-8.
42. Folkins A, E Jarboe, J Hecht, M Muto and C Crum (2018). "Chapter 24 – Assessing pelvic epithelial cancer risk and intercepting early malignancy." In *Diagnostic Gynecologic and Obstetric Pathology (Third Edition)*, 844-64. Philadelphia: Content Repository Only! <https://doi.org/10.1016/B978-0-323-44732-4.00024-8>.
43. Galea, Rogers. Moving beyond the cause constraint: a public health of consequence. *The American Journal of Public Health.* Vol. 108, No.5. 2018; Editorial 602-603.
44. Glyone S. Two cases of squamous carcinoma of the lung occurring in asbestosis. *Tubercle.* 1935; (17)1:5-10.
45. Gori GB. Session II: Introduction-ovarian exposure concerns. *REGUL TOXICOL PHARMACOL.* 1995;21(2):252-3.
46. Goff BA, Mueller PR, Muntz HG, Rice LW. Small chest-tube drainage followed by bleomycin sclerosis for malignant pleural effusions. *Obstet Gynecol.* 1993;81(6):993-6.
47. Graham, Jenkins. Value of modified starch as substitute for talc. *Lancet.* 1952; 1(6708):590-1.
48. Griffiths K, Chandler JA, Henderson WJ, Joslin CAF. Ovarian cancer: some new analytical approaches. *Postgrad Med J.* 1973;49(568):69-72.
49. Grivennikov, Greten, Karin M. Immunity, inflammation and cancer. *Cell.* 2010; 140(6):883-99.

50. Gross JL, Disanzio TG, Younes RN, Haddad FJ, Da Silva RA, Avertano ABM. Do concomitant ascites influence the effectiveness of palliative surgical management of pleural effusion in patients with malignancies? *World J Surg.* 2009;33(2):266-71.
51. Harper A, G Saed. Talc induces a pro-oxidant state in normal and ovarian cancer cells through gene point mutations in key redox enzymes - Abstract, Society of Gynecologic Oncology, 2018, *in press*.
52. Hartge PA. A Review of Perineal Talc Exposure and Risk of Ovarian Cancer. *REGUL TOXICOL PHARMACOL.* 1995;21(2):254-60.
53. Harter P, Du Bois A. Does tubal sterilization protect against ovarian cancer? *Gynakol Prax.* 2003;27(3):455-8.
54. Herbst AL. The epidemiology of ovarian carcinoma and the current status of tumor markers to detect disease. *AM J OBSTET GYNECOL.* 1994;170(4):1099-107.
55. Hernan. The C-word: scientific euphemisms do not improve causal inference from observational data. *The American Journal of Public Health (AJPH).* 2018; Vol. 108. No. 5:616-619.
56. Horiuchi A, Konishi I. Prevention of ovarian cancer development. *Nippon Rinsho.* 2004;62 Suppl 10:597-600.
57. Horn D, Dequanter D, Lothaire P. Palliative treatment of malignant pleural effusions. *Acta Chir Belg.* 2010;110(1):32-4.
58. Huncharek M, Muscat J. Perineal talc use and ovarian cancer risk: A case study of scientific standards in environmental epidemiology. *Eur J Cancer Prev.* 2011;20(6):501-7.
59. IARC (International Agency for Research on Cancer) (1987) Talc. IARC monographs on evaluation of carcinogenic risk of chemicals to humans, Vol. 42, IARC, Lyon, France, 185-224.
60. IARC (International Agency for Research on Cancer) (2010) Carbon black, titanium dioxide, and talc, Vol. 93, IARC, Lyon, France.
61. IARC (International Agency for Research on Cancer) (2012) Talc. Arsenic, Metals Fibres, and Dusts: A review of human carcinogens, Vol. 100C, IARC, Lyon, France.
62. Institute of Medicine; National Academies of Sciences, Engineering, and Medicine (2016). *Ovarian Cancers: Evolving Paradigms in Research and Care*
63. Hunn J, Rodriguez GC. Ovarian cancer: Etiology, risk factors, and epidemiology. *CLIN OBSTET GYNECOL.* 2012;55(1):3-23.
64. Jordan SJ, Purdie DM, Whiteman DC, Webb PM. Risk factors for epithelial ovarian cancer. *Cancer Forum.* 2003;27(3):148-51.
65. Kasper CS, Chandler PJ, Jr. Possible morbidity in women from talc on condoms. *JAMA.* 1995;273(11):846-7.
66. Kennedy L, Rusch VW, Strange C, Ginsberg RJ, Sahn SA. Pleurodesis using talc slurry. *CHEST.* 1994;106(2):342-6.
67. Kiraly O, Gong G, Olipitz W, Muthupalani S, Engelward BP. Inflammation-induced cell proliferation potentiates DNA damage-induced mutations in vivo. *PLoS genetics.* 2015; 11(2): e1004901.

68. Kolschmann S, Ballin A, Gillissen A. Clinical efficacy and safety of thoracoscopic talc pleurodesis in malignant pleural effusions. *CHEST*. 2005;128(3):1431-5.
69. Kupryjańczyk J. Adenomatoid tumour of the ovary and uterus in the same patient. *Zentralbl Allg Pathol*. 1989;135(5):437-44.
70. Ladjimi S, M'Raihi L, Djemel A, Mathlouthi A, Ben Ayed F, Zegaya M. [Results of talc administration using thoracoscopy in neoplastic pleurisies. Apropos of 218 cases]. *Revue des maladies respiratoires*. 1989;6(2):147-50.
71. Langseth H, Andersen A. Cancer incidence among women in the Norwegian pulp and paper industry. *AM J IND MED*. 1999;36(1):108-13.
72. Lauchlan SC. The secondary mullerian system revisited. *International journal of gynecological pathology : official journal of the International Society of Gynecological Pathologists*. 1994;13(1):73-9.
73. La Vecchia C. Epidemiology of ovarian cancer: A summary review. *EurJ Cancer Prev*. 2001;10(2):125-9.
74. Levin. "Baby powder battles: Johnson & Johnson internal documents reveal asbestos worries". <https://www.fairwarning.org/2018/01/talc-documents-reveal/>.
75. Lockey. Nonasbestos fibrous minerals. *Clinics in chest medicine*. 1981; 2(2):203-18.
76. Lombardi G, Nicoletto MO, Gusella M, Fiduccia P, Dalla Palma M, Zuin A, et al. Intrapleural paclitaxel for malignant pleural effusion from ovarian and breast cancer: A phase II study with pharmacokinetic analysis. *Cancer Chemother Pharmacol*. 2012;69(3):781-7.
77. Longo D, Young R. COSMETIC TALC AND OVARIAN CANCER. *Lancet*. 1979;314(8150):1011-2.
78. Lowe KA, Shah C, Wallace E, Anderson G, Paley P, McIntosh M, et al. Effects of personal characteristics on serum CA125, mesothelin, and HE4 levels in healthy postmenopausal women at high-risk for ovarian cancer. *Cancer Epidemiol Biomarkers Prev*. 2008;17(9):2480-7.
79. Lundin, Dossus, Clendenen, Krogh, Grankvist, Wulff, Sieri, Arlsan, Lenner, Berrino, Hallmans, Zeleniuch-Jacquotte, Toniolo, Lukanova. C-reactive protein and ovarian cancer: a prospective study nested in three cohorts (Sweden, USA, Italy). *Caner Causes & Control: CCC*. 2009; Vol. 20, Issue 7, PP 1151-1159.
80. Lumachi F, Mazza F, Ermani M, Chiara GB, Basso SMM. Talc pleurodesis as surgical palliation of patients with malignant pleural effusion. Analysis of factors affecting survival. *Anticancer Res*. 2012;32(11):5071-4.
81. Mad'Ar R, Straka S, Baška T. Is ovarian cancer associated with talcum powder? *Hygiena*. 2002;47(4):239-42.
82. Mager HJ, Maesen B, Verzijlbergen F, Schramel F. Distribution of talc suspension during treatment of malignant pleural effusion with talc pleurodesis. *Lung cancer (Amsterdam, Netherlands)*. 2002;36(1):77-81.
83. Malden LT, Tattersall MH. Malignant effusions. *QJM*. 1986;58(3-4):221-39.

84. Mallen, Townsend, Tworoger. Risk factors for ovarian carcinoma. *Hematology/Oncology Clinics of North America*. 2018; 32(6):891-902.
85. Markman M, Muggia FM. Intracavitary chemotherapy. *Crit Rev Oncol Hematol*. 1985;3(3):205-33.
86. Mayer D, C Kasper, P Chandler (1995). To the Editor: Talc and Condoms and reply, *JAMA* 274(16):1269.
87. McLemore MR, Miaskowski C, Aouizerat BE, Chen LM, Dodd MJ. Epidemiological and genetic factors associated with ovarian cancer. *Cancer Nurs*. 2009;32(4):281-8.
88. Medford ARL, Maskell NA. A national survey of oncologist and chest physicians' attitudes towards empirical anti-oestrogen therapy, early pleurodesis and preference of sclerosing agents in malignant breast and ovarian pleural disease [1]. *Palliative Med*. 2005;19(5):430-1.
89. Meisler JG. Toward optimal health: The experts discuss ovarian cancer. *J Women's Health Gender Med*. 2000;9(7):705-10.
90. Møller P, P Danielsen, K Jantzen, M Roursgaard & S Loft. Oxidatively damaged DNA in animals exposed to particles, *Critical Reviews in Toxicology*, 2013;43:2, 96-118
91. Møller P, N Jacobsen, J Folkmann, P Danielsen, L Mikkelsen, J Hemmingsen, L Vesterdal, L Forchhammer, H Wallin & S Loft. Role of oxidative damage in toxicity of particulates, *Free Radical Research*, 2010;44:1, 1-46.
92. Musani AI. Treatment options for malignant pleural effusion. *Curr Opin Pulm Med*. 2009;15(4):380-7.
93. Muscat JE, Barish M. Epidemiology of talc exposure and ovarian cancer: A critical assessment. *Comments Toxicol*. 1998;6(5):327-35.
94. Muscat JE, Wynder EL. Re: "Perineal powder exposure and the risk of ovarian cancer". *AM J EPIDEMIOL*. 1997;146(9):786.
95. Moon M, J Park, B Choi, S Park, D Kim, Y Chung, N Hisanaga, I Yu. Risk assessment of baby powder exposure through inhalation. *Official Journal of Korean Society of Toxicology*. 27(3):137-147.
96. Narod SA. Talc and ovarian cancer. *Gynecol Oncol*. 2016.
97. Natow AJ. Talc: need we beware? *Cutis*. 1986;37(5):328-9.
98. Neill AS, Nagle CM, Spurdle AB, Webb PM. Use of talcum powder and endometrial cancer risk. *Cancer Causes Control*. 2012;23(3):513-9.
99. Newhouse ML. Cosmetic talc and ovarian cancer. *Lancet*. 1979;2(8141):528.
100. Ness RB. Ovarian cancer, inflammation and endometriosis. *CME J Gynecol Oncol*. 2003;8(1):33-40.
101. Ness, R. Does talc exposure cause ovarian cancer?:IGCS-0015 Ovarian Cancer. *International Journal of Gynecological Cancer: Official Journal of the International Gynecological Cancer Society*, 2015;25 Suppl. 1:51
102. Özyurtkan MO, Balci AE, Çakmak M. Predictors of mortality within three months in the patients with malignant pleural effusion. *Eur J Intern Med*. 2010;21(1):30-4.

103. Okada. Beyond foreign-body induced carcinogenesis: impact of reactive oxygen species derived from inflammatory cells in tumorigenic conversion and tumor progression. *Internal Journal of Cancer*. 2007; 121(11):2364-72.
104. Park, Schidlkrut, Alberg, Bandera, Barnholtz-Sloan, Bondy, Crankshaw, Funkhouser, Moorman, Peters, Terry, Wang, Ruterbusch, Schwartz, Cote. Benign gynecology conditions are associated with ovarian cancer risk in African-American women: a case control study. *Cancer Causes Control*. 2018; Vol. 29, Issue 11, PP 1081-1091.
105. Pauler DK, Menon U, McIntosh M, Symecko HL, Skates SJ, Jacobs IJ. Factors influencing serum ca125ii levels in healthy postmenopausal women. *Cancer Epidemiol Biomarkers Prev*. 2001;10(5):489-93.
106. Pelfrene A, Shubik P. Is talc a carcinogen? A review of present data. *NOUV PRESSE MED*. 1975;4(11):801-3.
107. Porzio G, Marchetti P, Paris I, Narducci F, Ricevuto E, Ficorella C. Hypersensitivity reaction to carboplatin: Successful resolution by replacement with cisplatin. *Eur J Gynaecol Oncol*. 2002;23(4):335-6.
108. Radic, Vucak, Milosevic, Marusic, Vukicevic, Marusic. Immunosuppression induced by talc granulomatosis in the rat. *Clinical and Experimental Immunology*. 1988; 73(2):316-21.
109. Reid BM, Permuth JB, Sellers TA. Epidemiology of ovarian cancer: a review. *Cancer Biol Med*. 2017;14(1):9-32.
110. Reid, De Klerk, Musk. Does exposure to asbestos cause ovarian cancer? A systematic literature review and meta-analysis. *Cancer Epidemiology, Biomarkers & Prevention: a Publication of the American Association for Cancer Research, Cosponsored by the American Society of Preventive Oncology*. 2011; 20(7):1287-98.
111. Rothman, K., Greenland, S., & Lash, TL. (2008). *Modern Epidemiology*, 3rd Edition. Philadelphia, PA: Lippincott Williams & Wilkins.
112. Reuter, Gupta, Chaturvedi, Aggarwal. Oxidative stress, inflammation, and cancer: how are they linked?. *Free Radical Biology & Medicine*. 2010; 49(11):1603-16.
113. Roe FJ. Controversy: cosmetic talc and ovarian cancer. *Lancet*. 1979;2(8145):744.
114. Ross. Geology, asbestos and health. *Environmental Health Perspectives*. 1974; 9:123-124.
115. Sagae S, Mori M, Moore MA. Risk factors for ovarian cancers: Do subtypes require separate treatment in epidemiological studies? *Asian Pac J Cancer Preven*. 2012;3(1):5-16.
116. Saka H, Shimokata K. State of the art: treatment of malignant pleural and pericardial effusions. *Gan To Kagaku Ryoho*. 1997;24 Suppl 3:418-25.
117. Salehi F, Dunfield L, Phillips KP, Krewski D, Vanderhyden BC. Risk factors for ovarian cancer: An overview with emphasis on hormonal factors. *J Toxicol Environ Health Part B Crit Rev*. 2008;11(3-4):301-21. Salvador S, Scott S, Francis JA, Agrawal A, Giede C. No. 344- Opportunistic Salpingectomy and Other Methods of Risk Reduction for Ovarian/Fallopian Tube/Peritoneal Cancer in the General Population. *J Obstet Gynaecol Can*. 2017;39(6):480-93.

118. Salvador S, Scott S, Francis JA, Agrawal A, Giede C. No 344-Salpingectomy opportuniste et autres méthodes pour réduire le risque de cancer de l'ovaire, de la trompe de Fallope et du péritoine dans la population générale. *J Obstet Gynaecol Can.* 2017;39(6):494-508.
119. Sanchez-Armengol A, Rodriguez-Panadero F. Survival and talc pleurodesis in metastatic pleural carcinoma, revisited: Report of 125 cases. *CHEST.* 1993;104(5):1482-5.
120. Shan, Lui. Inflammation: a hidden path to breaking the spell of ovarian cancer. *Cell Cycle (Georgetown, Tex).* 2009; 8(19):31707-11.
121. Shedbalkar AR, Head JM, Head LR, Murphy DJ, Mason JH. Evaluation of talc pleural symphysis in management of malignant pleural effusion. *J Thorac Cardiovasc Surg.* 1971;61(3):492-7.
122. Shen N, Weiderpass E, Antilla A, Goldberg MS, Vasama-Neuvonen KM, Boffetta P, et al. Epidemiology of occupational and environmental risk factors related to ovarian cancer. *Scandinavian journal of work, environment & health.* 1998;24(3):175-82.
123. Shlebak AA, Clark PI, Green JA. Hypersensitivity and cross-reactivity to cisplatin and analogues. *Cancer Chemother Pharmacol.* 1995;35(4):349-51. Silva EG. The Origin of Epithelial Neoplasms of the Ovary: An Alternative View. *Adv Anat Pathol.* 2016;23(1):50-7.
124. Shoham Z. Epidemiology, etiology, and fertility drugs in ovarian epithelial carcinoma: Where are we today? *FERTIL STERIL.* 1994;62(3):433-48.
125. Sioris T, Sihvo E, Salo J, Räsänen J, Knuuttila A. Long-term indwelling pleural catheter (PleurX) for malignant pleural effusion unsuitable for talc pleurodesis. *Eur J Surg Oncol.* 2009;35(5):546-51.
126. Sueblinvong T, Carney ME. Ovarian cancer: risks. *Hawaii Med J.* 2009;68(2):40-6.
127. Sueblinvong T, Carney ME. Current understanding of risk factors for ovarian cancer. *Curr Treat Options Oncol.* 2009;10(1-2):67-81.
128. Tamaya T. Epidemiology of ovarian cancer. *Nippon Rinsho.* 2004;62 Suppl 10:435-40.
129. Tortolero-Luna G, Mitchell MF. The epidemiology of ovarian cancer. *Journal of cellular biochemistry Supplement.* 1995;23:200-7.
130. Tortolero-Luna G, Mitchell MF, Rhodes-Morris HE. Epidemiology and screening of ovarian cancer. *OBSTET GYNECOL CLIN NORTH AM.* 1994;21(1):1-23.
131. Trabert B, R Ness, W Lo-Ciganic, M Murph, E Goode, E Poole, L Brinton, et al (2014). Aspirin, Nonaspirin Nonsteroidal Anti-inflammatory drug, and acetaminophen use and risk of invasive epithelial ovarian cancer: a pooled analysis in the Ovarian Cancer Association Consortium, *Journal of the National Cancer Institute* 106(2):djt431.
132. Urban N, Hawley S, Janes H, Karlan BY, Berg CD, Drescher CW, et al. Identifying post-menopausal women at elevated risk for epithelial ovarian cancer. *Gynecol Oncol.* 2015;139(2):253-60.
133. U.S. Department of Health & Human Service – Public Health Service, Agency for Toxic Substances and Disease Registry – “Toxicological profile for asbestos”.
<https://www.atsdr.cdc.gov/toxprofiles/tp61.pdf>.

134. Van Gosen B, H Lowers, S Sutley, and C. Gent. Using the geologic setting of talc deposits as an indicator of amphibole asbestos content. *Environmental Geology*. 45 (7):920-939.
135. Venter PF. Ovarian epithelial cancer and chemical carcinogenesis. *Gynecol Oncol*. 1981;12(3):281-5.
136. Verma A, Taha A, Venkateswaran S, Tee A. Effectiveness of medical thoracoscopy and thorascopic talc poudrage in patients with exudative pleural effusion. *Singapore Med J*. 2015;56(5):268-73.
137. Virta. The phrase relationship of talc and amphiboles in a fibrous talc sample. Vol. 8923 of the U.S. Dept. of the Interior, Bureau of Mines – Science.
138. Vitonis AF, Titus-Ernstoff L, Cramer DW. Assessing ovarian cancer risk when considering elective oophorectomy at the time of hysterectomy. *Obstet Gynecol*. 2011;117(5):1042-50.
139. Webb P, Gertig D, Hunter D. Ovarian Cancer. *Textbook of Cancer Epidemiology*: Oxford University Press; 2009.
140. Webb PM. Environmental (nongenetic) factors in gynecological cancers: Update and future perspectives. *Future Oncol*. 2015;11(2):295-307.
141. Whitworth JM, Schneider KE, Fauci JM, Bryant AS, Cerfolio RJ, Straughn JM. Outcomes of patients with gynecologic malignancies undergoing video-assisted thorascopic surgery (VATS) and pleurodesis for malignant pleural effusion. *Gynecol Oncol*. 2012;125(3):646-8.
142. Wehner AP. Biological effects of cosmetic talc. *Food Chem Toxicol*. 1994;32(12):1173-84.
143. Wehner AP. Is cosmetic talc 'safe'? *Comments Toxicol*. 1998;6(5):337-66.
144. Wehner AP. Cosmetic talc should not be listed as a carcinogen: Comments on NTP's deliberations to list talc as a carcinogen. *REGUL TOXICOL PHARMACOL*. 2002;36(1):40-50.
145. Wentzensen N, Wacholder S. Talc use and ovarian cancer: Epidemiology between a rock and a hard place. *J Natl Cancer Inst*. 2014;106(9).
146. Werner. Presence of asbestos in talc samples. *Atenschutzinformation*. 1982; 21:5-7.
147. Whysner J, Mohan M. Perineal application of talc and cornstarch powders: Evaluation of ovarian cancer risk. *AM J OBSTET GYNECOL*. 2000;182(3):720-4.
148. Wu, Song, Wei Zhu, Patricia Thompson, and Yusuf A. Hannun. 2018. "Evaluating Intrinsic and Non-Intrinsic Cancer Risk Factors." *Nature Communications* 9 (1): 3490. <https://doi.org/10.1038/s41467-018-05467-z>.

Other Materials

1. WCD000254-WCD000255
2. IMERYS210136-IMERYS210137
3. IMERYS241994-IMERYS242004
4. IMERYS242050
5. IMERYS322241-IMERYS322242

6. IMERY5422289- IMERY5422290
7. JNJ000087166-JNJ000087230
8. JNJ000251888-JNJ000251890
9. JNJ000261010-JNJ000261027
10. JNJ000460665-JNJ000460673
11. JNJ000526231-JNJ000526676
12. JNJAZ55_000000577-JNJAZ55_000000596
13. JNJAZ55_000003357
14. JNJAZ55_000012423-JNJAZ55_000012430
15. JNJI4T5_000004099-JNJI4T5_000004100
16. JNJI4T5_000006431-JNJI4T5_000006432
17. JNJMX68_000004996-JNJMX68_000005044
18. JNJNL61_000001534-JNJNL61_000001535
19. JNJNL61_000014431-JNJNL61_000014437
20. JNJNL61_000020359
21. JNJNL61_000052427
22. JNJNL61_000061857
23. JNJNL61_000063473
24. John Hopkins, Trial Testimony, *Berg v. Johnson & Johnson* 2013
25. Deposition Transcript & Exhibits – John Hopkins, Aug. 16 & 17, 2018, Oct. 26, 2018, Nov. 5, 2018
26. Deposition Transcript & Exhibits – Joshua Muscat, Sept. 25, 2018
27. Deposition Transcript & Exhibits – Julie Pier, Sept. 12 & 13, 2018
28. Deposition Transcripts - Linda Loretz, Oct. 2, 2018
29. Deposition Exhibits for Linda Loretz - Exh. 106, 107, 108, Oct. 2, 2018
30. Deposition Transcript of Alice Blount, Apr. 13, 2018
31. Educational report of Thomas Dydek
32. Expert report of Jack Siemiatycki.
33. Expert report of Laura Plunket (Oules).
34. Fair warning TalcDoc 15.
35. Fair warning TalcDoc 5- Exhibit 113 (JNJNL91_000022019).
36. Letter from Cancer Prevention Coalition to FDA re: Citizen's Petition seeking carcinogenic labeling on all cosmetic talc products, Nov. 17, 1994.
37. Letter from Cancer Prevention Coalition to FDA re: Citizen's Petition seeking a cancer warning on cosmetic talc products, May 13, 2008.
38. Letter from Personal Care Products Council to FDA re: Comments on Citizen's Petition to the Commissioner of the Food and Drug Administration Seeking a Cancer Warning on Talc Products, July 21, 2009.
39. Transcripts of CIR meeting (Unpublished)

40. Rothman, Pastides, Samet. Interpretation of epidemiologic studies of talc and ovarian cancer. 2000.
41. Zuckerman D, D Shapiro. Talcum Powder and Ovarian Cancer, National Center for Health Research, May 7, 2018 <http://www.center4research.org/talcum-powder-ovarian-cancer/>

EXHIBIT A

Sonal Singh M.D., M.P.H

Sonal Singh, MD MPH

55 Lake Ave North
Worcester, MA 01655-0002 USA
Tel: 774 442 6611.

Sonal.Singh@umassmemorial.org

Education

MPH, Bloomberg School of Public Health, Johns Hopkins University
Baltimore, MD 6/2005 to 5/2008

Internal Medicine Residency, Unity Health System, affiliate University of Rochester
Sch of Medicine and Dentistry, Rochester, NY 7/2002 to 6/2005

MD, Patna Medical College, Patna, India 12/91 to 05/1999

Academic Appointments

Associate Professor, Department of Family Medicine & Comm Health 10/2016 to date
Department of Medicine, University of Massachusetts Medical School

Assistant Professor, Dept of Medicine, Johns Hopkins Univ SOM 7/2009 to 9/2016

Assistant Professor, Center for Public Health and Human Rights
Bloomberg School of Public Health, JHU (joint) 7/2009 to 9/2016

Assistant Professor, Department of Medicine, Wake Forest University 7/2007 to 6/2009

Instructor, Department of Medicine, Wake Forest University 7/2005 to 06/2007

Employment History

Associate Professor, Department of Fam Medicine & Comm Hlth 10/2016-present
Meyers Primary Care Institute & Department of Medicine (Joint)
University of Massachusetts Medical School
Role: Clinician- Investigator

Associate Professor, Department of Quantitative Health Sciences 10/2018-present
University of Massachusetts Medical School
Role: Clinician- Investigator

Assistant Professor, Dept of Medicine, Johns Hopkins University. 7/2009 to 9/2016
Role: Clinician- Investigator

Assistant Professor, Department of Medicine, Wake Forest University 7/2007 to 6/2009
Role: Clinician- Educator

Instructor, Department of Medicine, Wake Forest University 7/2005 to 6/2007

Sonal Singh M.D., M.P.H

Role: Clinician- Educator

Residency (Medicine) Unity Healthy System, affiliate of the University of Rochester, Rochester,
NY 7/2002 to 6/2005

Role: PGY 1, PGYII and PGY III Internal Medicine Resident

Research Associate, Clinical Pharmacology, Ohio State University 3/2001 to 6/2002
Role: Research assistant in clinical trials

Voluntary Research Associate, Clinical Pharmacology, Ohio State University 8/2000 to 2/2001
Role: Research assistant in clinical trials

USMLE STEP 1, II, III and Clinical Skills Exam Preparation 2/2000 to 7/2000
Role; Medical student

Resident, Medicine, Patna Medical College, Patna, Bihar, India 2/1998 to 1/2000
Role: Junior Resident in Medicine

Compulsory rotatory internship, Patna Medical College, Patna, India 12/97 to 12/98
Role: Fulfilling requirements for completion of medical degree in India

Certification and Licensure

Diplomate, American Board of Internal Medicine 8/2005-12/25

Massachusetts Board of Physicians 8/2016-8/2019

Physicians and Surgeons of Maryland (Inactive) 2009-2017

North Carolina Medical Board (Inactive) 2005 to 2009

Professional Memberships and Activities

Massachusetts Medical Society 2017-current

American College of Physicians 2003-2019

International Society of Pharmacoepidemiology 2011-current

Society of General Internal Medicine 2003 to 2016

International Society of Pharmacoeconomic Outcomes Research 2016 to 2017

Academy Health 2013

Global Health Council 2006 to 2010

Honors and Awards

Finalist W. Leigh Thompson Excellence in Research: Faculty Award, JHU	2016
Visiting Professor, Department of Medicine, Univ of Alabama	2013
3 rd Best Abstract (trainee) 29 th ICPE Montreal, Canada	2013
Bruce Squires Award for the Best Research Paper, CMAJ	2011
Scholars Abstract Award, Society for Clinical and Translational Sciences.	2010
Society of General Internal Medicine Clinical Investigator Award (Mid-Atlantic)	2010
Elected, Delta Omega Honorary Public Health Society, Johns Hopkins University	2008
Master Teacher Award, WFUSOM	2008
Tinsley R Harrison Faculty Outpatient Teaching Award, WFUSOM	2007
Tinsley R Harrison Faculty Outpatient Teaching Award, WFUSOM	2006
Senior-Resident Scholarship award, Unity Health System, NY	2005
ACP Health and Public Policy Scholarship, NY	2005

Committee Assignments and Administrative Services

American College of Physicians, Massachusetts Chapter, Health Policy Committee	2018
Chairs Advisory Council, Department of Fam Medicine & Comm Hlth	10/2016-present
American College of Chest Physicians, Cough Guideline Expert Panel	2017- present
Associate faculty, Welch Ctr for Prevention, Epi & Clin Research, JHU	2015 to 2016
Associate-Director, Center for Drug Safety and Effectiveness, JHU	2013 to 2016
Affiliate faculty, Center for Hlth Services and Outcomes Research, Johns Hopkins Bloomberg School of Public Health	2012 to 2016
World Health Organization, International Agency of Research on Cancer (IARC) Monograph- 108 Working group, Lyon, France.	2013

Sonal Singh M.D., M.P.H

Preferred Items for Reporting of Systematic Reviews and Meta-analysis of harms Working Group
Alberta Canada. 2012

Member, Health & Human Rights Working Group, JHU Center for Aids Research 2012

Core faculty, Center for Public Health and Human Rights, Johns Hopkins Bloomberg School of
Public Health 2009 to 2016

Core faculty, Evidence-Based Practice Center, JHU 2009 to 2016

Medical Director, Outpatient Clinic, WFUSOM 7/2005-6/2009

Teaching Activities

Classroom

Comparative effectiveness research (2 cr), Johns Hopkins Medicine 2015 to 2016

Role: Developed course in CER for MD and MD/PhD trainees in the CTSA

Health and Human Rights, Johns Hopkins Bloomberg School of Public Health 2011 to 2015

Role: Annual lecture in the course for MPH students

Health Economic, Johns Hopkins Bloomberg School of Public Health 2013

Role: Annual lecture in the course for master's students

Pharmacoepidemiology, Johns Hopkins Bloomberg School of Public Health 2011-2015

Role: Annual lecture in the course for Masters and Doctoral students

Evidence-based Medicine, Johns Hopkins University School of Medicine 2012

Role: Course facilitator

Intro to Clinical Investigation, Johns Hopkins University School of Medicine 2012

Role: Annual lecture in the course

Clinical Epidemiology, Johns Hopkins Bloomberg School of Public Health, 2010-2014

Role: Annual lecture in the course

Patient Physician and Society, Johns Hopkins University School of Medicine 2009

Role: Course facilitator

Clinical Teaching

Outpatient medicine 2016-2018

Sonal Singh M.D., M.P.H

Role: Precepting residents and medical students in clinic at University of Massachusetts Medical School

Evidence Based Medicine

2012-2014

Role: Developed a novel course to teach Evidence based Medicine to Osler medical residents at Johns Hopkins University School of Medicine

Outpatient medicine

2005 to 2009

Role: Precepting residents in clinic at Wake Forest University

Inpatient Medicine

2005 to 2009

Role: Precepting internal medicine residents at Wake Forest University

Trainee /Junior Faculty Name	Mentoring Role	Title of Research Project/Paper	Current Position and Institution	Training Period
Univ of Massachusetts				
Mayuko Itofukunaga, MD	Faculty mentor	Systematic review of decision aids for lung cancer screening	Assistant Professor- Pulmonary Medicine and Critical Care	2017-18
Nathaniel, Erskine MD, PhD (student)	Scholarly activity	SR of herpes zoster and cardiovascular disease	MD/PhD Student Umass Med School	2017
Richeek Pradhan MS	Scholarly activity	Comparison of data on Adverse events	Phd Student McGill University	2017-18
Johns Hopkins Univ				
Omar Mansour	Scholarly activity	SGLT2inhibitors and cardiovascular outcomes	Masters student	2018
Geetha Iyer, MD	Faculty mentor	Multiple Pharmacoepidemiologic studies	Doctoral student, HSPH	2015-16
Sathiya Priya Marimathu	Faculty mentor	Generic drugs and patient oriented outcomes	MHS Student, JHMI	2015-16
Yohalakshmi Chelladurai, MD, MPH	RA Scholarly activity	Review of varenicline	Resident physician, Mercer, Atlanta	2013
Hsien-Yen Chang PhD	Faculty mentor	Pharmacoepidemiologic studies	Assistant Scientist at JHU	2011-15
Hasan Shihab, MD, MPH	RA Scholarly activity	Review of GLP-based therapies	Resident, Franklin Square, Baltimore	2013-14
Joshua Sclar, MD, MPH	Scholarly activity	Systematic review of attacks on health workers	General Preventive Medicine Resident	2013
Crystal Ng, MPH	Scholarly activity	Human Rights measures	MPH Student, JHSPH	2013
Ekta Agarwal, MPH	Capstone	Safety of novel anticoagulants	MPH student JHSPH	2013
Meijia Zhou, MHS	Scholarly activity	Adherence to novel anticoagulants	Doctoral student, Univ of Pennsylvania	2013
Kaitlin Hayman, MD	Capstone	SR of the impact of disasters On CVD outcomes	MPH student, JHSPH	2013
Wenze Tang, MPH	Scholarly activity	SCCS analysis of GIB bleeding with dabigatran	Doctoral student, HSPH	2013

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Omar Mansour	Scholarly activity	SGLT2inhibitors and cardiovascular outcomes	Masters student JHSPH	2018
Shabana Walia MD	Scholarly activity	SR of CVD among refugees and displaced	ER physician, UT Houston	2016-2018
Wake Forest Univ				
Aman Amin, MD	Resident	Inhaled corticosteroids and pneumonia	Practicing internist, NC	2007-09
Apurva Trivedi, MD	Scholarly activity	SSRIs and bleeding	Gastroenterologist	2007-09
Other institutions				
Tonya Breaux-Shropshire PhD, MPH	Scholarly activity	Systematic review	Post-doctoral trainee, UAB	2015
Abhay Kumar, MD	Resident Scholarly activity	Wernicke encephalopathy after gastric bypass: systematic review	Assistant Professor St Louis University	2007

Current Grants and Contracts

Grants

(Ming Tai-Seale)

2/2016-12/2021

PCORI

Improving Patient-Centered Communication in Primary Care: A Cluster Randomized Controlled Trial of the Comparative Effectiveness of Three Interventions

The aim is to compare three interventions to improve patient communication in primary care

Role: co-investigator

(PI Jerry Gurwitz)

08/2018- 09/2019

NIH/NIA-1 R56 AG061813-01

Project Title: Controlling and Stopping Cascades leading to Adverse Drug Effects Study in Alzheimer's Disease (CASCADES-AD)

Role : co-investigator

The aim is to develop interventions to prevent prescribing cascades among those with Alzheimer's related Dementia (ADRD)

Past Grants

Death Data Exploration

08/01/17- 03/02/18

FDA Foundational Elements 3 HHSF223200910006I

Task Order Number: HHSF22301012T

Efforts to Develop the Sentinel Initiative HHSF223200910006I.

Role (Project Lead)

Effect of Therapeutic Class on Generic Drug Substitutions.

2014-2016

U01FD005267-01 (PI, Jodi Segal)

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FDA 349,480
Role: Co-Investigator 0.6 CM

Comparative effectiveness Research & The Cochrane Eyes and Vision Group 2013-2016
U01 EY020522 (PI, Kay Dickersin)
NIH/NEI 825,397
Role: Co-Investigator 2.4 CM

Systematic review of gabapentin for neuropathic pain using multiple data sources 2015-2016
(PI, Caleb Alexander)
FDA Center of Excellence in Regulatory Science
Role: Co-Investigator (20% effort)

Integrating multiple data sources for meta-analysis to improve patient-centered outcomes
research 2014-2016
(PI- Dickersin)
PCORI (ME-1303-5785) \$698,174
Role: Advisor (2% effort)

Development of a scale for human rights violations. 2013-2014
(PI, Chaisson & Beyrer)
NIH Johns Hopkins Center for AIDS Research \$ 18,873
Role: Pilot Awardee

Comparative effectiveness review of therapeutic options for obesity in the Medicare population.
Johns Hopkins Evidence Based Practice Center. 2013-2014
PI (Eric Bass)
AHRQ \$125,000
Role: Project Principal Investigator (20% effort)

Center for Excellence in Comparative Effectiveness Education 2012-2013
PHRMA Foundation (PI Jodi Segal) Total Direct Cost: \$250,000
Role: Co-investigator (5% effort)

A multi criteria decision analysis to assist with regulatory decisions around benefit and risk
Partnership in Applied Comparative Effectiveness Science: 2010 to 2013
PI (PI, Jodi Segal).
FDA \$3,509,657
Role: Project Principal Investigator (25% effort)

Combination therapy vs. intensification of statin mono-therapy: An update. 2012-
2013
PI (E. Bass- P.I of EPC.)
AHRQ
Role: Advisor (5% effort)

Troponin cardiac marker during renal impairment. (E. Bass- P.I of EPC.) Agency for Health Care Quality and Research Role: Advisor (5% effort)	2012-2013	
To develop an instrument for attacks on health workers. PI (Len Rubenstein) US Institute of Peace Role: Co-investigator (10% effort)	2012-2013	
To develop an instrument for attacks on health workers. PI (Len Rubenstein) McArthur Foundation Role: Co-investigator (15% effort)	2012-2013	\$434,782
To conduct a benefit and harm assessment of <i>roflumilast</i> in COPD. Johns Hopkins ICTR Role: Co-investigator (5% effort)	2012-2013	
To develop a China-JHU consultation for civil society public health professionals. Open Society Foundation Role: PI (20% effort). Proposal for a public health training program.		2012 \$49,534
PACER. PI (Rothman) Google-Flu Role: Coinvestigator (5%) Systematic reviewer and meta-analysis expert.		2012
Methods for Balancing Benefits and Harms in Systematic Reviews Johns Hopkins Evidence Based Practice Center. (PI, Bass) AHRQ Role: Project Task Leader and co-Investigator (10% effort)		2011-2012 \$188,871
Comparative effectiveness review of Meditation Programs for Stress and Wellbeing Johns Hopkins Evidence Based Practice Center. (PI, Bass) AHRQ Role: Project Task Leader and co-Investigator (15% effort)		2011-2012 \$375,666
Comparative effectiveness review of prevention of VTE in special populations Johns Hopkins Evidence Based Practice Center. (PI, Bass) AHRQ Role: Project Principal Investigator (20% effort)		2011-2012 \$375,666

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To prevent and respond to gender-based violence (GBV) in refugee and conflict-affected populations. 2010-2011
(PI, Vu & Rubenstein) \$293,946
Role: Co-investigator (10% effort)

Comparative effectiveness review of oral hypoglycemic medications
Johns Hopkins Evidence Based Practice Center. (PI, Bass) 2009-2010
AHRQ \$125,000
Role: Co- Investigator (0% effort)

Johns Hopkins Clinical Research Junior Faculty Award. 2009-2012
NIH-KL2
ICTR
Role: Recipient (75% salary support)

Measuring exposure to human rights violations among men who have sex with men.
(PI, Mullany). 2009-2010
Center for Global Health Johns Hopkins \$50,000
Role: Co-investigator (0% effort).

Research ethics for conducting research in vulnerable populations and unstable settings.
(PI, Mills) 2007-2009
CIHR \$99, 887
Role: Co-investigator (10% effort).

Patents None.

Editorial work

Editor-in-chief and founder
BMC Conflict and Health 2007-12

Editorial Board Membership

Evidence Based Medicine (BMJ Group of Journals) 2017-current
Drug Safety 2008-16
American College of Physicians-PIER

Grant review 2012-current

Medical research foundation of New Zealand
Johns Hopkins Center for Public Health and Human Rights
Junior Faculty Research Grants
Medical Research Council of South Africa
Catalina Health Technology Assessment, Spain
Diabetes, UK
Johns Hopkins Medicine Research Council Synergy Awards
Johns Hopkins Institute for Clinical and Translational Research

Peer Review

1. <i>Acta Diabetologica</i>
2. <i>American Heart Journal</i>
3. <i>American Journal of Addictions</i>
4. <i>American Journal of Cardiovascular Drugs</i>
5. <i>American Journal of Managed Care</i>
6. <i>American Journal of Psychiatry</i>
7. <i>Annals of Internal Medicine</i>
8. <i>Annals of Medicine</i>
9. <i>Australian Medical Journal</i>
10. <i>BMJ</i>
11. <i>BMC Clinical Pharmacology</i>
12. <i>British Journal of Clinical Pharmacology</i>
13. <i>Bulletin of the World Health Organization</i>
14. <i>Chest</i>
15. <i>Circulation</i>
16. <i>Canadian Medical Association Journal</i>
17. <i>Clinical Pharmacology and Therapeutics</i>
18. <i>Clinical Trials</i>
19. <i>Cardiovascular Drugs & Therapy</i>
20. <i>Cochrane Collaboration</i>
21. <i>Disasters</i>
22. <i>Diabetologia</i>
23. <i>Drug and Alcohol Dependence</i>
24. <i>Diabetes Obesity and Metabolism</i>
25. <i>Drug Safety</i>
26. <i>Epidemiology</i>
27. <i>European Journal of Neurology</i>
28. <i>European Journal of Pharmacology</i>
29. <i>European Respiratory Journal</i>
30. <i>Expert Opinion in Drug Safety</i>
31. <i>Global Public Health</i>
32. <i>Health Policy</i>
33. <i>International Journal of Epi</i>
34. <i>International Journal of Obesity</i>

35. <i>Journal of the American College of Cardiology</i>
36. <i>Journal of the American Medical Association (5 in last 12 mo)</i>
37. <i>Journal of the American Medical Association-Internal Medicine</i>
38. <i>Journal of Cardiac Failure</i>
39. <i>Journal of Medical Case Reports</i>
40. <i>Journal of the Pancreas</i>
41. <i>Journal of General Internal Medicine</i>
42. <i>Medscape General Medicine</i>
43. <i>Medical Journal of Australia</i>
44. <i>Nephrology Dialysis Transplantation</i>
45. <i>North Carolina Medical Journal</i>
46. <i>Nutrition, Metabolism & Cardiovascular Diseases</i>
47. <i>Pediatric Infectious Disease Journal</i>
48. <i>Pharmacoepidemiology & Drug Safety-Best Reviewer Award 2013</i>
49. <i>Public Library of Science Medicine</i>
50. <i>Primary Care Respiratory Journal</i>
51. <i>Pediatrics</i>
52. <i>Research Synthesis Methods</i>
53. <i>Respiratory Medicine</i>
54. <i>Respirology</i>
55. <i>Southern Medical Journal</i>
56. <i>The Lancet</i>
57. <i>Thorax</i>
58. <i>Tropical Medicine & International Health</i>

Abstracts and Presentations

Oral Presentations

National/International

1. GLP-1-based therapies and risk of pancreatitis: A matched case-control study. 29th International Society of Pharmacoepidemiology, Annual Meeting, Montreal Convention Center, August 26. Montreal, Quebec, Canada.2013
2. GLP-1 based therapies and risk of pancreatitis. 36th SGIM Annual Meeting, Denver, Colorado Posters. 2013
3. Risk of fractures with inhaled corticosteroids in COPD: Systematic review and meta-analysis of randomized controlled trials and observational studies, Society of General Internal Medicine, Minneapolis, Minnesota. 2011

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4. Odds of fractures with inhaled corticosteroids in COPD: Systematic review and meta-analysis of clinical trials and observational studies, 27th International Society of Pharmacy-Epidemiology, Annual Meeting, Hyatt Regency August 24th. Chicago, Illinois. 2011

Local/Regional

Not applicable

Posters

National/International Meetings

1. Diagnostic algorithms for cardiovascular death in administrative claims databases. A systematic review 2018. International Society of Pharmacoepidemiology, Prague, August 24, 2018.
2. Risk of gastrointestinal bleeding among dabigatran users-a self-controlled case series analysis. Health Care Systems Research Network, San Deigo, March 22, 2017.
3. GLP-1 based therapies and risk of pancreatitis. Pancreatitis, Diabetes, and Pancreatic Cancer Workshop. NIH, Bethesda, Maryland. 2013
4. Thiazolidinediones and risk of bladder cancer: A systematic review and meta-analysis. 36th SGIM Annual Meeting, Denver, Colorado.2013
5. Who is the patient's doctor? Primary care responsibility and co-management relationships among generalist and non-generalist physicians in the National Ambulatory Care Survey, 2002 SGIM 29th Annual Meeting, Los Angeles, California.2006
6. The educational value of case reports from the SGIM national meeting in the internal medicine clerkship. SGIM 29th Annual Meeting, Los Angeles, California.2006
7. Using IPod technology to create a self-guided clinic tour for resident orientation SGIM 29th Annual Meeting, Los Angeles, California.2006
8. Narcotic management in chronic non-malignant pain. A survey of resident's knowledge and attitudes. SGIM 29th Annual Meeting, Los Angeles, California.2006
9. Formulary conversion programs pose a significant risk to patients, SGIM 27th Annual Meeting, Chicago, Illinois.2004

Local regional meetings

Inhaled corticosteroids and the risk of fractures in COPD: A systematic review and meta-analysis. DOM Annual retreat, Johns Hopkins University 2011

Invited presentations

National/International

1. Oral direct acting antivirals and the incidence or recurrence of hepatocellular carcinoma. NIH Collaboratory Grand Rounds [Web] March 2, 2018
2. Resurgence of hepatocellular carcinoma in the era of oral direct acting antivirals. Cause or Consequence? Fundamentals of Biomedicine Seminar Series. Texas Tech University Health Sciences Center. El Paso, Texas Dec 13, 2017

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3. Aligning evidence with preferences: Methodological Challenges and Opportunities. - Department of Medicine. Dartmouth-Hitchcock Medical Center, Dartmouth, New Hampshire, June 15, 2016
 - Dartmouth-Hitchcock Medical Center, Dartmouth, New Hampshire, June 15, 2016
 - Department of Health Services and Research, Michael De-Bakey VA and Baylor University, Houston, Texas, May 16, 2016.
 - Meyers Primary Care Institute and Department of Family and Community Medicine, University of Massachusetts, Massachusetts, March 31 and June 9 2016.
 - VA Center for Chronic Disease and Outcomes Research, Minnesota VA, March 2016.
 - Department of Medicine. University of Central Florida, Orlando, Florida, November 2015.
 - Center for Health Policy and Research Grand Rounds. UC Davis, Sacramento California, Oct 9 2015;
 - Center for Evidence and Outcomes, Agency for Health Care Research and Quality. Gaithersville Maryland, August 31, 2015.
4. Risks of Spiriva Respimat outweigh its benefit: A Debate. Inhalation Asia, University of Hong Kong, Department of Pharmacology and Pharmacy, Hong Kong. 2013
5. GLP-1-based therapies and risk of pancreatitis. Center for Clinical Epidemiology and Biostatistics Seminar Series, Philadelphia, Pennsylvania. 2013
6. Visiting Professor. Department of Medicine. University of Alabama. 2013
7. Value based health care: Can shared decision making methods get us there? Center for Value and Effectiveness, Medicine Institute, Cleveland Clinic, Noon Conference.2013
8. Role of Multi-criteria decision analysis in regulatory policy
 - Stanford Prevention Research Center, Stanford University, Palo Alto, Stanford, California. 2013
 - South Carolina College of Pharmacy, Columbia, South Carolina.2013
 - Department of Medicine. UC Davis, Sacramento, California.2013
 - Department of Clinical Sciences, UT Southwestern, Dallas, Texas.2013
 - Department of Medicine, Geisenger Medical Center, Danville, Pennsylvania. 2013
9. Weighing benefits and risks: Role of shared decision making in type 2 diabetes. CTSA Grand Rounds, Mayo Clinic, Rochester, Minnesota. 2013
10. Are long-acting muscarinic agents safe for patients with COPD: A Debate. Airway Vista, Asan Medical Center, Seoul, Korea
11. Academia and industry collaboration for cardiovascular risk mitigation. CBI and Applied Clinical Trials. 6th Annual Summit, Closing Address. Ritz Carlton, Arlington, Virginia.2012
12. Varenicline: Where are we today? Tobacco Disease Research Program, UCSF. San Francisco California. Varenicline debate.2012
13. The Maoist Insurgency in Nepal: Health Systems Challenges and Opportunities Conference on Health in Fragile States: Challenges for the Next Decade. United States Institute of Peace. Washington DC.2011

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14. Standards of Care and the Role of Community Advocacy in Clinical Trials. Clinical Research in Developing Countries, IIIrd Annual Marcus Evans Conference, Washington, DC.2008
15. Nepal-A Case study. Integrating public health methods into Conflict Analysis. Norman Patterson School of International Affairs, Carleton University, Ottawa, Canada.2007

Local/Regional

1. Oral direct acting antivirals and the incidence or recurrence of hepatocellular carcinoma. Research Seminar Series, Department of Family Medicine and Community Health. University of Massachusetts Medical School. June 15.2018
2. Safety of novel anticoagulants vs warfarin- a case study using complementary study designs. Quantitative Health Sciences, University of Massachusetts Medical School, February 28, 2017
3. GLP-1-based therapies and risk of pancreatic adverse events. University of Maryland, Division of Endocrinology, Metabolism and Nutrition, Grand Rounds, Baltimore, Maryland. 2013
4. Thiazolidinediones and Patient-Oriented Outcomes in Type 2 Diabetes, GIM Grand Rounds. Johns Hopkins University School of Medicine. 2012
5. Patient-Centered Benefit and Risk Assessment. Center for Health Services and Outcomes Research. Johns Hopkins University 2012
6. Varenicline and cardiovascular and neuropsychiatric adverse events: Do benefits outweigh risks? Welch Center Grand Rounds. Johns Hopkins University. 2011
7. The new wave, HIV, Human Rights and Men who have Sex with Men in Nepal. Johns Hopkins Bloomberg School of Public Health, 2011.
8. Network Meta-analysis and Serious Adverse Events. Network Meta-Analysis Methods Workshop. Johns Hopkins Bloomberg School of Public Health. 2010
9. Thiazolidinediones and Cardiovascular Outcomes in Type 2 Diabetes. Internal Medicine Grand Rounds. Wake Forest University School of Medicine, 2008
10. How Safe Are Our Drugs and How Do We Know? North Carolina ACP, Durham.2008
11. Clinico Pathologic Conference. Internal Medicine Grand Rounds. Wake Forest University School of Medicine, 2007
12. Globalization and Health Equity: An emerging Challenge for Academic Medicine. Internal Medicine Grand Rounds. Wake Forest University School of Medicine, 2007
13. Thiazolidinediones and Cardiovascular Disease: The Seduction of Common Sense. Epidemiology Seminar Series, Public Health Sciences. Wake Forest University 2007

Workshops and Precourses

1. ISPOR National Meeting, Next Generation Comparative Effectiveness Research- Are we getting organized to facilitate research for the individual patient? Washington, DC May 24, 2016 (workshop)
2. SGIM national meeting, developing high-quality search strategies for systematic reviews. 2010
3. SGIM national meeting, Systematic Review. 2009

Peer reviewed original research publications (reverse chronological order)

Trainees *

1. **Singh S**, Fouyazi H, Anzuoni K, Goldman L, Min JY, Griffin M, Grijalva CG, Morrow JA, Whitmore C, Leonard CE, Selvan M, Nair V, Zhou Y, Toh S, Petrone A, Williams J, Fazio-

- Eynullayeva E, Swain R, Cole DT, Andrade S. Diagnostic algorithms for cardiovascular death in administrative claims databases. A systematic review. *Drug Safety* 2018 (accepted)
2. **Singh S**, Zeiman S, Alan Go, Fortmann S, Wenger N, Fleg JL, Radziszewska B, Stone NJ, Zoungas S, Gurwitz J. Statins for Primary Prevention in Older Adults – Moving toward Evidence-Based Decision-Making. *J Am Geriatr Soc*. 2018 Oct 2. doi: 10.1111/jgs.15449. [Epub ahead of print]
3. Tisminetzky M, Nguyen HL, Gurwitz J, McManus D, Gore J, **Singh S**, Yarzebski J, Goldberg RJ. Magnitude and impact of multiple chronic conditions with advancing age in older adults hospitalized with acute myocardial infarction. *International Journal of Cardiology*. Published Online: August 22, 2018. <https://doi.org/10.1016/j.ijcard.2018.08.062>.
4. Chang HY, **Singh S**, Mansour O, Baksh S, Alexander GC. Association Between Sodium-Glucose Cotransporter-2 (SLGT-2) Inhibitors and Lower Extremity Amputation: A Retrospective Cohort Study. *JAMA Internal Medicine* 2018. 10.1001/jamainternmed.2018.3034 <http://dx.doi.org/10.1001/jamainternmed.2018.3034>. August 13, 2018
5. Birring SS, Kavanagh JE, Irwin RS, Keogh K, Lim KG, Ryu JH; **CHEST Expert Cough Panel**. Treatment of Interstitial Lung Disease Associated Cough: CHEST Guideline and Expert Panel Report. *Chest*. 2018 Jul 20. pii: S0012-3692(18)31075-4. doi: 10.1016/j.chest.2018.06.038. [Epub ahead of print]
6. **Singh S**, Nautiyal A, Loke YK. Oral Direct-acting antivirals and the incidence or recurrence of hepatocellular carcinoma: a systematic review and meta-analysis. *Frontline Gastroenterology* Published Online First: 30 July 2018. doi: 10.1136/flgastro-2018-101017
7. Chang AB, Oppenheimer JJ, Rubin BK, Weinberger M, Irwin RS; **CHEST Expert Cough Panel**. Chronic Cough Related to Acute Viral Bronchiolitis in Children. *Chest*. 2018 Apr 26. pii: S0012-3692(18)30632-9. doi: 10.1016/j.chest.2018.04.019. [Epub ahead of print]
8. Haar RJ, Risko CB, **Singh S**, Rayes D, Albaik A, Alnajar M, et al. (2018) Determining the scope of attacks on health in four governorates of Syria in 2016: Results of a field surveillance program. *PLoS Med* 15(4): e1002559. <https://doi.org/10.1371/journal.pmed.1002559>
9. Pradhan R, * **Singh S**. Comparison of data on Serious Adverse Events and Mortality in ClinicalTrials.gov corresponding journal articles and medical reviews: A cross-sectional analysis. *Drug Safety* 2018 Apr 11. doi: 10.1007/s40264-018-0666-y. [Epub ahead of print]
10. Wu CH, Tu ST, Chang YF, Chan DC, Chien JT, Lin CH, **Singh S**, Dasari M, Chen JF, Tsai KS. Fracture liaison services improve outcomes of patients with osteoporosis-related fractures: A systematic literature review and meta-analysis. *Bone*. 2018 2018 Jun; 111:92-100. doi: 10.1016/j.bone.2018.03.018. Epub 2018 Mar 16
11. Field SK, Escalante P, Fisher DA, Ireland B, Irwin RS; **CHEST Expert Cough Panel**. Cough Due to TB and Other Chronic Infections: CHEST Guideline and Expert Panel Report. *Chest*. 2018 Feb;153(2):467-497. doi: 10.1016/j.chest.2017.11.018. Epub 2017 Nov 28.
12. Erkskine NA, *Tran H, Levin LL, Ulbricht CM, Fingerroth JD, Kiefe CI, Goldberg RJ, **Singh S**. A systematic review and meta-analysis on herpes zoster and the risk of cardiac and cerebrovascular events. *PLoS One* 2017 Jul 27;12(7): e0181565
13. **Singh S**, Nautiyal A. Aortic dissection and aortic aneurysms associated with fluoroquinolones: a systematic review and meta-analysis of observational studies. *American Journal of Medicine* 2017;130(12):1449-1457

14. Marimuthu S, Iyer G, * Segal JB, **Singh S**. Patient-relevant outcomes associated with generic tamsulosin, levothyroxine, and amphetamine in the FAERS: A pilot study. *J Comp Eff Res*. 2017;6(5):437-447.
15. Iyer G, *Marimuthu S, *Segal JB, **Singh S**. An algorithm to identify generic drugs in the FDA Adverse Event Reporting System. *Drug Safety* 2017 2;40(9):799-808.
16. Tang W, *Chang HY, *Zhou M, * **Singh S**. Risk of gastrointestinal bleeding among dabigatran users-a self-controlled case series analysis. *Sci Rep* 2017 Jan 20; 7:40120. doi: 10.1038/srep40120.
17. Onasanya O, Iyer G, * Lucas E, Lin D, **Singh S**, Alexander GC. Association between exogenous testosterone and cardiovascular events: an overview of systematic reviews. *Lancet Diabetes Endocrinol*. 2016 ;4(11):943-956
18. **Singh S**, Wright EE, Kwan AY, Thompson JC, Syed IA, Korol EE, Waser NA, Yu MB, Juneja R. Glucagon-like peptide-1 receptor agonists compared with basal insulins for the treatment of type 2 diabetes mellitus: a systematic review and meta-analysis. *Diabetes Obes Metab*. 2017;19(2):228-238
19. Alexander GC, Iyer G, Lucas E, Lin D, **Singh S**. Cardiovascular risks of exogenous testosterone among men. *Am J Med*. 2017 ;130(3):293-305
20. Houston KT, Shrestha A, Kafle HM, **Singh S**, Mullany L, Thapa L, Surkan PJ 1. Social isolation and health in widowhood: A qualitative study of Nepali widows' experiences. *Health Care Women Int*. 2016 ;37(12):1277-1288
21. Zorzela, L., Loke, Y.K., Ioannidis, J.P., Golder, S., Santaguida, P., Altman, D.G., Moher, D., Vohra, S., Boon, H., Clark, J., Derry, S., Gallivan, J., Gardiner, P., Gøtzsche, P., Loder, E., Napoli, M., Pilkington, K., Shekelle, P., **Singh S**, Witt, C., Lasserson, T., Wu, T., Shamseer, L., Mulrow, C. PRISMA harms checklist: improving harms reporting in systematic reviews. *BMJ* 2016;352: i157.
22. Fain KM, Yu T, Li T, Boyd CM, **Singh S**, Puhan MA, Evidence Selection for a Prescription Drug's Benefit-Harm Assessment: Challenges and Recommendations, *JCE* 2016 Jun;74:151-7
23. Vu A, Wirtz A, Pham K, **Singh S**, Rubenstein L, Glass N, Perrin N. Psychometric properties and reliability of the Assessment Screen to Identify Survivors Toolkit for Gender Based Violence (ASIST-GBV): results from humanitarian settings in Ethiopia and Colombia. *Confl Health*. 2016 Feb 9; 10:1.
24. Wirtz, AL, Glass N, Pham K, Perrin N, Rubenstein LS, **Singh S**, Vu A. Comprehensive development and testing of the ASIST-GBV, a screening tool for responding to gender-based violence among women in humanitarian settings. *Conflict and Health* 201610:7 DOI: 10.1186/s13031-016-0071-z
25. Hayman KG, *Sharma D, Wardlow RD II, **Singh S**. Burden of cardiovascular morbidity and mortality following humanitarian emergencies: a systematic literature review. *Prehosp Disaster Med*. 2015;30(1):1-9.
26. Chang HY, *Zhou M, * Tang W, * Alexander GC, **Singh S**. Risk of gastrointestinal bleeding associated with oral anticoagulants: population based retrospective cohort study. *BMJ*. 2015;350:h1585 (editorial by Mary S Vaughn).

Sonal Singh M.D., M.P.H

27. Abraham NS, **Singh S**, Alexander GC, Heien H, Haas LR, Crown W, Shah ND. Comparative risk of gastrointestinal bleeding with dabigatran, rivaroxaban, and warfarin: population-based cohort study. *BMJ*. 2015;350:h1857.
28. Chang HY, Hsieh CF, **Singh S**, Tang W, Chiang YT, Huang WF. Anti-diabetic therapies and the risk of acute pancreatitis: a nationwide retrospective cohort study from Taiwan. *Pharmacoepidemiol Drug Saf*. 2015 Jun;24(6):567-75
29. Maruthur NM, Joy SM, Dolan JG, Shihab HM, **Singh S**. Use of the Analytic Hierarchy Process for medication decision-making in type 2 diabetes. *PloS One*. 2015 ;10(5): e0126625.
30. Breaux-Shropshire TL, * Judd E, Vucovich L, Shropshire TS, **Singh S**. Does home blood pressure monitoring improve patient outcomes? A systematic review comparing home and ambulatory blood pressure monitoring on blood pressure control and patient outcomes. *Integrated Blood Pressure Control* 2015 3; 8:43-9.
31. Zhou M, *Chang HY, Segal JB, Alexander GC, **Singh S**. Adherence to a novel oral anticoagulant among patients with atrial fibrillation. *J Manag Care Spec Pharm*. 2015; 21(11):1054-62.
32. Puhan MA, Yu T, Stegeman I, Varadhan R, **Singh S**, Boyd CM. Benefit-Harm Analysis and Charts for Individualized and Preference-Sensitive Prevention - The example of low dose aspirin for primary prevention of cardiovascular disease and cancer. *BMC Med*. 2015; 13:250.
33. Mayo-Wilson E, Hutfless S, Li T, Gresham G, Fusco N, Ehmsen J, Heyward J, Vedula S, Lock D, Haythornthwaite J, Payne JL, Cowley T, Tolbert E, Rosman L, Twose C, Stuart EA, Hong H, Doshi P, Suarez-Cuervo C, **Singh S**, Dickersin K. Integrating multiple data sources (MUDS) for meta-analysis to improve patient-centered outcomes research: a protocol for a systematic review. *Syst Rev* 2015; 4(1).
34. Morton MJ, DeAugustinis ML, Velasquez CA, **Singh S**, Kelen GD. Developments in Surge Research Priorities: A Systematic Review of the Literature Following the Academic Emergency Medicine Consensus Conference, 2007-2015. *Acad Emerg Med*. 2015 ;22(11):1235-52.
35. *Shihab HM, Akande T, Armstrong K, **Singh S**, Loke YK. Risk of pancreatic adverse events associated with the use of glucagon-like peptide-1 receptor agonist and dipeptidyl peptidase-4 inhibitor drugs: A systematic review and meta-analysis of randomized trials. *World J Meta-Anal* 2015; 3(6): 254-283
36. Haut ER, Garcia LJ, Shihab HM, Brotman DJ, Stevens KA, Sharma R, Chelladurai Y, Akande TO, Shermock KM, Kebede S, Segal JB, **Singh S**. The Effectiveness of Prophylactic Inferior Vena Cava Filters in Trauma Patients: A Systematic Review and Meta-analysis. *JAMA Surg* 2014; 149(2):194-202
37. **Singh S**, Ambrosio M, Semini I, Tawil O, Saleem M, Imran M, Beyrer C. Revitalizing the HIV response in Pakistan: a systematic review and policy implications. *Int J Drug Policy* 2014;25(1):26-33.
38. Turner LW, Nartey D, Stafford RS, **Singh S**, Alexander GC. Ambulatory Treatment of Type 2 Diabetes Mellitus in the United States, 1997-2012. *Diabetes Care*. 2014;37(4):985-92
39. Yu T, Fain K, Boyd C, Varadhan R, Weiss CO, Li T, **Singh S**, Puhan MA. Benefits and harms of roflumilast in moderate to severe COPD. *Thorax* 2014; 69:616-22

Sonal Singh M.D., M.P.H

40. Turner RM, Kwok CS, Chen-Turner C, Maduakor CA, **Singh S**, Loke YK. Thiazolidinediones and associated risk of Bladder Cancer: a Systematic Review and Meta-analysis. *Br J Clin Pharmacol.* 2014 78(2):258-7
41. Goyal M, **Singh S**, Sibinga E, Gould NF, Rowland-Seymour A, Sharma R, Berger Z, Sleicher D, Maron D, Shihab HM, Ranasinghe PD, Linn S, Bass EB, Haythornthwaite JA. Meditation Programs for Psychological Stress and Well-being: A Systematic Review and Meta-analysis. *JAMA Intern Med.* 2014 174(3):357-68 (editorial by Gorroll. Moving towards Evidence Based Complementary Care)
42. Vu A, Adam A, Wirtz A, Pham K, Rubenstein L, Glass N, Beyrer C, **Singh S**. The Prevalence of Sexual Violence among Female Refugees in Complex Humanitarian Emergencies: a Systematic Review and Meta-analysis. *PLOS Currents Disasters.* 2014 Mar 18. Edition 1.
43. Wirtz AL, Pham K, Glass N, Loochkarth S, Kidane T, Cuspoca D, Rubenstein LS, **Singh S**, Vu A. Gender-based violence in conflict and displacement: qualitative findings from displaced women in Colombia. *Confl Health.* 2014; 8:10.
44. *Haar RJ, Footer KH, **Singh S**, Sherman SG, Branchini C, Sclar J, Clouse E, Rubenstein LS. Measurement of attacks and interferences with health care in conflict: validation of an incident-reporting tool for attacks on and interferences with health care in eastern Burma. *Conflict and Health.* 2014, 8:23.
45. Cavallazzi R, El-Kersh K, Abu-Atherah E, **Singh S**, Loke YK, Wiemken T, Ramirez J. Midregional proadrenomedullin for prognosis in community-acquired pneumonia: A systematic review. *Respir Med.* 2014 ;108(11):1569-1580.
46. Dorsey ER, Brocht AFD, Nichols PE, Darwin KC, Anderson KE, Beck CA, **Singh S**, Biglan KM, Shoulson I. Depressed mood and suicidality in individuals exposed to tetrabenazine in a large Huntington disease observational study. *Journal of Huntington's Disease* 2013; 2(4): 509-515.
47. Ter Riet G, Chesley P, Gross AG, Siebeling L, Muggensturm P, Heller N, Umbehr M, Vollenweider D, Yu T, Akl EA, Brewster L, Dekkers OM, Mühlhauser I, Richter B, **Singh S**, Goodman S, Puhan MA. All That Glitters Isn't Gold: A Survey on Acknowledgment of Limitations in Biomedical Studies. *PLoS One* 2013 ;8(11): e73623.
48. Wirtz AL, Glass N, Pham K, Rubenstein LS, **Singh S**, Vu A. Development of a screening tool to identify female survivors of gender-based violence in humanitarian settings: qualitative evidence from research among refugees in Ethiopia. *Conflict and Health* 2013, 7:13.
49. Loke YK, Ho R, Smith M, Wong O, Sandhu M, Sage W, **Singh S**. Systematic review evaluating cardiovascular events of the 5-alpha reductase inhibitor - Dutasteride. *J Clin Pharm Ther* 2013 38(5):405-15
50. Grosse Y, Loomis D, Lauby-Secretan B, El Ghissassi F, Bouvard V, Benbrahim-Tallaa L, Guha N, Baan R, Mattock H, Straif K; International Agency for Research on Cancer Monograph Working Group. Collaborators: Stewart BW, Biggar RJ, Lachenmeier DW, **Singh S**, Tsuda H, Baguley B, Marques MM, Tseng CH, Knight TL, Beland FA, Betz JM, Carcache de Blanco EJ, Cunningham ML, Dunnick JK, Guo L, Jameson CW, Karagas M, Lunn RM, McCormick DL, Witt KL, Zhou S. Carcinogenicity of some drugs and herbal products. *Lancet Oncol.* 2013; 14(9):807-8.

Sonal Singh M.D., M.P.H

51. Maruthur NM, **Joy S**, Dolan J, Segal JB, Shihab HM, Singh S. Systematic assessment of benefits and risks: study protocol for a multicriteria decision analysis using the Analytic Hierarchy Process for comparative effectiveness research. *F1000 Research*. 2013 Jul 24; 2:160
52. Loke YK, **Singh S**. Risk of acute urinary retention associated with inhaled anticholinergics in patients with chronic obstructive lung disease: systematic review. *Therapeutic Advances in Drug Safety* 2013, 4: 19-26.
53. **Singh S**, Chang HY, Richards TM, Weiner JP, Clark JM, Segal JB. Glucagonlike Peptide 1-Based Therapies and Risk of Hospitalization for Acute Pancreatitis in Type 2 Diabetes Mellitus: A Population-Based Matched Case-Control Study. *JAMA Intern Med* 2013 28; 173:1843-4. (editorial by Peter Butler in JAMA Internal Medicine and Edwin Gale in the BMJ)
54. **Singh S**, Chang HY, Richards TM, Weiner JP, Clark JM, Segal JB. Thiazolidinedione use and risk of hospitalization for pneumonia in Type 2 Diabetes Mellitus: A Population-Based Matched Case-Control Study. *F1000Research* 2013 2:145.
55. Brotman DJ, Shihab HM, Prakasa KR, Kebede S, Haut ER, Sharma R, Shermock K, Chelladurai C, **Singh S**, Segal JB. Pharmacological and Mechanical Strategies for Preventing Venous Thromboembolism after Bariatric Surgery: A Systematic Review and Meta-analysis. *JAMA Surg* 2013 148(7):675-86.
56. Kebede S, Prakasa KR, Shermock K, Shihab HM, Brotman DJ, Sharma R, Chelladurai Y, Haut ER, **Singh S**, Segal JB. A systematic review of venous thromboembolism in patients with renal insufficiency, obesity, or on antiplatelet agents. *J Hosp Med* 2013 ;8(7):394-401.
57. *Chelladurai Y, Stevens KA, Haut ER, Brotman DJ, Sharma S, Shermock KM, Kebede S, **Singh S**, Segal JB. Venous thromboembolism in patients with traumatic brain injury: a systematic review. *F1000Research* 2013. May 29; 2:132.
58. **Singh S**, Loke YK, Enright P, Furberg CD. The pro-arrhythmic and pro-ischaemic effects of inhaled anticholinergics. *Thorax* 2013 68: 114-116.
59. Denizard-Thompson NR, **Singh S**, Stevens SR, Miller DP, Wofford JL. iPod™ technology for teaching patients about anticoagulation: a pilot study of mobile computer-assisted patient education. *Prim Health Care Res Dev* 2012 13: 42-7.
60. Treadwell JR, **Singh S**, Talati R, McPheeters ML, Reston JT. A Framework for “Best Evidence” Approaches in Systematic Reviews. *J Clin Epidemiol* 2012; 65: 1159-62.
61. Moore T, Glenmullen J, Maltzberger JT, Furberg CD, **Singh S**. Suicidal Behavior and Depression in Smoking Cessation Treatments. *PLOS One* 2011; 6: e27016.
62. Kwok CS, Yeong JK, Turner RM, Cavallazzi R, **Singh S**, Loke YK. Statins and associated risk of pneumonia: a systematic review and meta-analysis of observational studies. *Eur J Clin Pharmacol* 2012; 68(5): 747-55.
63. Moore T, **Singh S**, Furberg CD. The FDA and New Safety Warnings. *Archives of Internal Medicine* 2012 172:78-80.
64. Kwok CS, Arthur AK, Anibueze CI, **Singh S**, Cavallazzi R, Loke YK. Risk of Clostridium difficile Infection with Acid Suppressing Drugs and Antibiotics: Meta-Analysis. *Am J Gastroenterol* 2012; 107:1011-9 (with an editorial by Leontadis, Miller and Howden. How much do PPIs contribute to C difficile infection)

65. **Singh S**, Pant SB, Dhakal S, Pokhrel S, Mullany LC. Human Rights Violations among Sexual and Gender Minorities in Kathmandu, Nepal: A qualitative investigation. *BMC International Health and Human Rights* 2012; 12:7
66. **Singh S**, Chang SM, Matchar DB, Bass EB. Chapter 7. Grading a body of evidence on diagnostic tests. *J Gen Intern Med.* 2012; 27: S47-55.
67. Treadwell JR, Uhl S, Tipton K, Shamliyan T, Vishwanathan M, Berkman ND, Sun X, Coleman CI, Elshaug AG, **Singh S**, Wang SY, Ramakrishnan R. Assessing equivalence and noninferiority. *J Clin Epidemiol* 2012; 65: 1144-9.
68. **Singh S**, Loke YK. Drug Safety Assessment in Clinical Trials: Methodologic Challenges and Opportunities. *Trials* 2012; 13: 138.
69. Puhan M, **Singh S**, Varadhan R, Weiss C, Boyd CM. Methods for Benefit and Harm Assessment in Systematic Reviews. *BMC Medical Research and Methodology* 2012; 12: 173.
70. Mills EJ, Wu P, Chong G, Ghement I, **Singh S**, et al. Efficacy and safety of statin treatment for cardiovascular disease: a network meta-analysis of 170,255 patients from 76 randomized trials. *Q J Med* 2011; 104: 109-24.
71. **Singh S**, Loke YK, Furberg CD. Long-term use of thiazolidinediones and the associated risk of pneumonia or lower respiratory tract infection: Systematic review and meta-analysis. *Thorax* 2011; 66: 383-388.
72. Bennett WL, Maruthur NM, **Singh S**, et al. Comparative effectiveness and safety of medications for Type 2 Diabetes: An update including new drugs and two drug combinations. *Annals of Internal Medicine* 2011; 154: 602-13. Copublished with linked AHRQ report:
73. Loke YK, Kwok CS, **Singh S**. Comparative Cardiovascular Effects of Thiazolidinediones: A systematic review and meta-analysis of observational studies. *BMJ* 2011; 342: d1309.
74. Loke YK, Cavallazi R, **Singh S**. Risk of fractures with inhaled corticosteroids in COPD: systematic review and meta-analysis of randomized controlled trials and observational studies. *Thorax* 2011; 66: 699-708.
75. Miller DP Jr, Spangler JG, Case LD, Goff DC Jr, **Singh S**, Pignone M. Effectiveness of a Web-Based Colorectal Cancer Screening Patient Decision Aid: A Randomized Controlled Trial in a Mixed Literacy Population. *Am J Prev Med* 2011; 40: 608-15.
76. Li T, Puhan MA, Vedula SS, **Singh S**, et al. Network meta-analysis-highly attractive but more methodological research is needed. *BMC Medicine* 2011; 9: 79.
77. **Singh S**, Loke YK, Enright P, Furberg CD. Mortality Associated with Tiotropium Respimat® in Patients with Chronic Obstructive Pulmonary Disease- A Systematic Review and Meta-Analysis of Randomized Controlled Trials. *BMJ* 2011; 342: d3215. (with an editorial by Chris Cates Safety of Tiotropium)
78. **Singh S**, Loke YK, Spangler JG, Furberg CD. Risk of serious adverse cardiovascular events with Varenicline: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. *CMAJ* 2011; 183:1359-66. (with an editorial by JT Hays. Varenicline for smoking cessation. Is it a heartbreaker?)

79. Loke YK, Kwok CS, **Singh S**. Risk of myocardial infarction and cardiovascular death associated with inhaled corticosteroids in COPD: a systematic review and meta-analysis. *Eur Respir J* 2010; 35: 1003-1021.
80. Navaneethan S, **Singh S**, Appasamy S, et al. Sodium bicarbonate therapy for prevention of contrast-induced nephropathy- A systematic review and meta-analysis. *AJKD* 2009; 53: 617-627.
81. Loke YK, **Singh S**, Furberg CD. Long-term use of thiazolidinediones and fractures in type 2 diabetes: Systematic Review. *CMAJ* 2009; 180: 32-39. (with an editorial by Lipscombe. Thiazolidinediones: Do harms outweigh benefits?)
82. **Singh S**, Amin A, * Loke YK. Long-term use of inhaled corticosteroids and risk of pneumonia in COPD: A meta-analysis. *Archives of Internal Medicine* 2009; 169: 219-229.
83. Attanayake V, McKay R, Joffres M, **Singh S**, Burkle Jr F, Mills E. Prevalence of mental disorders among children exposed to war: a systematic review of 7920 children. *Medicine Conflict and Survival* 2009; 25: 4-19.
84. Loke YK, Jeevanantham V*, **Singh S**. Bisphosphonates and atrial fibrillation: systematic review and meta-analysis. *Drug Safety* 2009; 32: 219-228.
85. Boyd M, Watkins F, **Singh S**, Haponik E, Chatterjee A, Conforti J, Chin Jr R. Prevalence of flexible bronchoscopic removal of foreign bodies in the advanced elderly. *Age and Ageing* 2009; 38: 396-400.
86. Loke YK, Trivedi A, **Singh S**. Meta-analysis: Gastrointestinal bleeding due to interaction between Selective Serotonin Reuptake Inhibitors and Non-Steroidal Anti-inflammatory drug. *Alimentary Pharmacol Ther* 2008; 27: 31-40.
87. Mills E, **Singh S**, Roach B, Chong S. Prevalence of mental disorders and torture among Bhutanese refugees in Nepal: A systematic review and its policy implications. *Medicine, Conflict and Survival* 2008; 24: 5-16.
88. Chaukiyal P, Nautiyal A, Radhakrishnan S, **Singh S**, Navaneethan S. Thromboprophylaxis in cancer patients with central venous catheters: A systematic review and meta-analysis. *Thromb Haemost* 2008; 99: 38-43.
89. Wofford JL, Wells M, **Singh S**. Best Strategies for Patient Education Regarding Anticoagulation with Warfarin: A systematic review. *BMC Health Services Research* 2008; 8: 40.
90. Navaneethan SD, Adoulat S, **Singh S**. A systematic review of patient and health system characteristics associated with late referral in chronic kidney disease. *BMC Nephrology* 2008;9: 3.
91. **Singh S**, Loke YK, Furberg CD. Inhaled anticholinergics and the risk of major adverse cardiovascular events in patients with chronic obstructive pulmonary disease: A systematic review and meta-analysis. *JAMA* 2008; 300: 1439-1450. (CME Article in JAMA)
92. Mills EJ, Checchi F, Orbinski JJ, Schull MJ, Burkle Jr FM, Beyrer C, Cooper C, Hardy C, **Singh S**, et al. Users' guides to the medical literature: how to use an article about mortality in a humanitarian emergency. *Confl Health* 2008; 30: 9.
93. **Singh S**, Kumar A. Wernicke encephalopathy after bariatric surgery: A systematic review. *Neurology* 2007; 68: 807-11.

94. **Singh S**, Sharma SP, Mills E, Poudel KC, Jimba M. Conflict Induced Internal Displacement in Nepal. *Medicine Conflict and Survival* 2007; 23: 103-110.
95. **Singh S**, Loke YK, Furberg CD. Thiazolidinediones and heart failure: A Teleo-Analysis. *Diabetes Care* 2007; 30: 2148-2153.
96. Beyrer C, Villar JC, Suwanvanichkij V, **Singh S**, Baral SD, Mills EJ. Neglected Diseases, Civil Conflicts and the Right to Health. *Lancet* 2007; 370: 619-627.
97. **Singh S**, Loke YK, Furberg CD. Long-term risk of cardiovascular events with rosiglitazone: A systematic review and meta-analysis. *JAMA* 2007; 298: 1189-1195. (with an editorial by DH Solomon and Winkelmeyer. Cardiovascular risk and the Thiazolidinediones déjà vu all over again?)
98. Mills EJ, **Singh S**. Health, Human Rights and the conduct of research within oppressed populations. *Global Health*. 2007; 3: 10.
99. Mills E Cooper C, Wu P, Rachlis B, **Singh S**, Guyatt GH. Randomized trials stopped early for harm in HIV/AIDS: A systematic survey. *HIV Clinical trials*; 2006; 7: 24-33.
100. Mills E, **Singh S**, Wilson K et al. The Challenges of involving traditional healers in HIV/AIDS care. *Int J STD & AIDS* 2006; 17: 360-363.
101. **Singh S**, Böhler E, Dahal K, Mills E. The state of child health and human rights in Nepal. *PloS Med* 2006 3; 7: e203
102. Mills EJ, **Singh S**, Zwi A, Nelson B, Nachega JB. The impact of conflict on HIV/AIDS in Africa. *Int J STD AIDS* 2006; 17: 713-717.
103. Mills E, Nixon S, **Singh S**, Dolma S, Nayyar A, Kapoor S. Enrolling women into HIV vaccine trials: An ethical imperative but a logistical challenge. *PloS Med* 2006; 3: e94.
104. Dolma S, **Singh S**, Lohfield L, Orbinski J, Mills E. Dangerous Journey: Documenting the Experience of Tibetan Refugees. *AJPH* 2006; 96: 2061-2064.
105. Wofford JL, **Singh S**. Exploring the Educational Value of Clinical Vignettes from the SGIM National Meeting in the Internal Medicine Clerkship: A Pilot Study. *JGIM* 2006; 21: 1195-1197.
106. Navaneethan SD, **Singh S**. A systematic review of barriers in access to renal transplantation among African Americans in the United States. *Clin Transplant* 2006; 20: 769-775.
107. Mills E, Nachega JB, Buchan I, Attaran A, Orbinski J, **Singh S** et al. Adherence to Antiretroviral therapy in Africa versus North America: A comparative meta-analysis. *JAMA* 2006; 296: 679-690.
108. Mills E, Nachega JB, Bangsberg D, **Singh S**, Rachlis B, Wu P, et al. Adherence to antiretroviral therapy: a systematic review and meta-analysis examining developed and developing nation patient-reported barriers and facilitators. *PLoS Med* 2006; 3: e438.
109. **Singh S**, Loke YK. Statins and pancreatitis: A systematic review of observational studies and spontaneous case reports. *Drug Saf* 2006; 29: 1123-32.
110. **Singh S**, Mills E, Dahal K. Nepal's war on Human Rights: A summit higher than Everest. *Int J Equity Health*. 2005; 4: 9.
111. **Singh S**, Mills E. Honeyman SW, Suvedi BK, Pant NP. HIV in Nepal: Is the conflict fueling the epidemic? *PLoS Med*. 2005; 2: e 216.

Sonal Singh M.D., M.P.H

112. Mills EJ, Rachlis B, Wu P, Wong E, Heise L, Wilson K, **Singh S**. Media reporting of Tenofovir trials in Cambodia and Cameroon. *BMC International Health and Human Rights* 2005; 5: 6.
113. Mills E, **Singh S**, Holtz T, Santa-Barbara J, Chase R, and Orbinski J. Prevalence of serious mental disorders among Tibetan refugees: A systematic review. *BMC International Health and Human Rights* 2005; 5: 7.
114. **Singh S**, Dolan JG, Centor RM. Optimal clinical management of Sore throat: A multi-criteria decision analysis. *BMC Medical Decision-Making* 2005;6; 14.

Accepted

None

Books and monographs

1. **Singh S**, Fouyazi H, Anzuoni K, Goldman L, Min JY, Griffin M, Grijalva CG, Morrow JA, Whitmore C, Leonard CE, Selvan M, Nair V, Zhou Y, Toh S, Petrone A, Williams J, Fazio-Eynullayeva E, Swain R, Cole DT, Andrade S. Diagnostic algorithms for cardiovascular death in administrative claims databases. A systematic review 2018. Sentinel Report. Prepared for the Food and Drug Administration.
2. Some drugs and herbal products / IARC Working Group on the Evaluation of Carcinogenic Risks to Humans (2013: Lyon, France) (IARC monographs on the evaluation of carcinogenic risks to humans; volume 108). Published by the International Agency for Research on Cancer, 150 cours Albert Thomas, 69372 Lyon Cedex 08, France ©International Agency for Research on Cancer, 2015 On-line publication, 15 September 2015.
3. Maruthur NM, Joy S, Dolan J, Segal JB, Shihab HM, **Singh S**. Systematic assessment of benefits and risks: A multicriteria decision analysis using the Analytic Hierarchy Process for comparative effectiveness research. FDA report 2013
4. Beyrer C, **Singh S**, Ambrosio M, Semini I. Revitalizing the HIV response in Pakistan: a systematic review and policy recommendations. World Bank, 2012.
5. Beyrer C, **Singh S**, Sudarshi D. Neglected tropical diseases, conflict and the right to health: A2, pgs 132- 155 in The Causes and Impacts of Neglected Tropical and Zoonotic Diseases: Opportunities for Integrated Intervention Strategies: Workshop Summary. Editors Eileen R. Choffnes and David A. Relman, Rapporteurs; Forum on Microbial Threats; Institute of Medicine ISBN 978-0-309.
6. Goyal M, **Singh S**, Sibinga EMS, Gould NF, Rowland-Seymour A, Sharma R, Berger Z, Sleicher D, Maron DD, Shihab HM, Ranasinghe PD, Linn S, Bass EB, Haythornthwaite JA. Meditation Programs for Psychological Stress and Well-being: Comparative Effectiveness Review No. 124 (Prepared by The Johns Hopkins University Evidence-based Practice Center, under Contract No. 290-2007-100061-1.) AHRQ Publication No. 13 (14)-EHC116-EF. Rockville, MD: Agency for Healthcare Research and Quality. January 2014
7. **Singh S**, Haut ER, Brotman DJ, Sharma R, Chelladurai Y, Shermock KM, Kebede S, Stevens KA, Prakasa KR, Shihab HM, Akande TO, Zeidan AM, Garcia LJ, Segal JB. Comparative Effectiveness of Pharmacologic and Mechanical Prophylaxis of Venous Thromboembolism Among Special Populations. Comparative Effectiveness Review No. 116. (Prepared by The

Sonal Singh M.D., M.P.H

Johns Hopkins University Evidence-based Practice Center, under Contract No. HHSA 290 2007 10061 I). AHRQ Publication No. 13-EHC082-1 Rockville, MD: Agency for Healthcare Research and Quality. May 2013

8. Puhan MA, **Singh S**, Weiss CO, Varadhan R, Sharma R, Boyd CM. Evaluation of the Benefit and Harm of Aspirin for Primary Prevention of Cardiovascular Events: A Comparison of Quantitative Approaches. Methods Research Report. (Prepared by the Johns Hopkins University Evidence-based Practice Center under Contract No. 290-2007-10061-I). AHRQ Publication No. 12(14)-EHC149-EF. Rockville, MD: Agency for Healthcare Research and Quality; November 2013.
9. Boyd CM, **Singh S**, Varadhan R, Weiss CO, Sharma R, Bass EB, Puhan MA. Methods for Benefit and Harm Assessment in Systematic Reviews. Methods Research Report. (Prepared by the Johns Hopkins University Evidence-based Practice Center under Contract No. 290-2007-10061-I). AHRQ Publication No. 12(13)-EHC150-EF. Rockville, MD: Agency for Healthcare Research and Quality; November 2012.
10. Treadwell JR, **Singh S**, Talati R, McPheeters ML, Reston JT. A Framework for "Best Evidence" Approaches in Systematic Reviews [Internet]. Rockville (MD): Agency for Healthcare Research and Quality (US); 2011 Jun. Report No: 11-EHC046-EF. AHRQ Methods for Effective Health Care.
11. Treadwell J, Uhl S, Tipton K, **Singh S**, Santaguida L, Sun X, Berkman N, Viswanathan M, Coleman C, Shamliyan T, Wang S, Ramakrishnan R, Elshaug A. Assessing Equivalence and Noninferiority. Methods Research Report. (Prepared by the EPC Workgroup under Contract No. 290-2007-10063.) AHRQ Publication No. 12-EHC045-EF. Rockville, MD: Agency for Healthcare Research and Quality, June 2012.
12. **Singh S**, Chang SM, Matchar DB, Bass EB. Grading a body of evidence on medical tests. AHRQ Publication No 12-EHC079-EF. Chapter 7 of the Methods Guide for Medical Test Reviews. 2012 (AHRQ Publication No 12-EHC017). Rockville, MD: Agency for Health Care Research and Quality; June 2012.
13. Bennett WL, Wilson LM, Bolen S, Maruthur N, **Singh S**, et al. Oral Diabetes Medications for Adults with Type 2 Diabetes. An Update. Comparative Effectiveness Review No. 27. (Prepared by Johns Hopkins Evidence-Based Practice Center under Contract No. 290-02-0018.) AHRQ Publication No. 11-EHC038. Rockville, MD: Agency for Healthcare Research and Quality, March 2011.
14. Khagendra Dahal* and **Sonal Singh**. "Primary Prevention-Acting on Human Rights in Nepal" in Peace Through Health; How health professionals can work for a less violent world" by Neil Arya & Joanna Santa Barbara. 187-188. @ 2008 Kumarian Press.

Editorials and other scholarly material in peer reviewed journals

1. **Singh S**, Nautiyal A. Fluoroquinolones increase the risk of aortic aneurysms and aortic dissection? *JACC* 2018; 72 (12): 1379-81
2. **Singh S**. The safety of generic prescription drugs in the United States. *Drug Safety* 2018; 45 (4):325-328.
3. **Singh S**. Valproate use during pregnancy was linked to autism spectrum disorder and childhood autism in offspring. *ACP Journal Club* 2013; 159: JC13-4.

Sonal Singh M.D., M.P.H

4. **Singh S.** Segal JB. Thiazolidinediones and macular edema: Comment on Thiazolidinediones and macular edema in type 2 diabetes. *Archives of Internal Medicine*. 2012. 172: 1011-3.
5. **Singh S.** Furberg CD. Inhaled anticholinergics for chronic obstructive pulmonary disease: comment on "inhaled anticholinergic drug therapy and the risk of acute urinary retention in chronic obstructive pulmonary disease." *Archives of Internal Medicine* 2011; 171: 920-2.
6. **Singh S.** Daily use of Aspirin reduces long-term risk of death due to some cancers. *ACP Journal Club* 2011; 154: JC3-2.
7. **Singh S,** Furberg CD. Review: Calcium supplements increase risk of myocardial infarction. *Evid Based Med* 2010; 15: 181.
8. **Singh S,** Furberg CD. Thiazolidinediones and Cardiovascular Outcomes in Type 2 Diabetes. *Heart* 2009; 95: 1-3.
9. **Singh S.** Clinical Research in Emerging Countries. Third Annual Marcus Evans Conference *IDrugs* 2008; 11: 724-727.
10. **Singh S,** Trivedi A. Spontaneous reports as evidence of Adverse Drug Reactions. *South Med J*. 2008; 101: 16.
11. **Singh S,** Orbinski J, Mills EJ. Conflict and Health: A paradigm shift in global health and human rights. *Conflict and Health* 2007, 1: 1.
12. **Singh S.** Nautiyal A. Secondary hypertension due to drugs and toxins: A challenge for research on harm. *South Med J*. 2007; 100: 665-666.
13. **Singh S.** Hydralazine-induced lupus. *South Med J* 2006; 99: 6-7.
14. **Singh S.** Amiodarone-induced alveolar hemorrhage *South Med J* 2006; 99: 329-30.
15. **Singh S** Angiotensin-converting enzyme inhibitor-induced acute pancreatitis: in search of the evidence. *South Med J* 2006; 99: 1327-1328.
16. **Singh S.** Wooltorton E. Increased mortality among elderly patients with dementia using atypical antipsychotics. *CMAJ* 2005 173; 3: 252.
17. **Singh S.** The Stone Circle. *CMAJ* 2005; 172: 522.
18. **Singh S.** Tears from the Land of Snow: Health and Human Rights in Tibet. *Lancet* 2004; 364: 1009.

Publication of Educational Materials

Peer-reviewed educational publications

1. **Singh S.** Type 2 diabetes pharmacoepidemiology update 2014: safety versus efficacy. *Curr Diab Rep*. 2014; 14(12):563.
2. Chelladurai Y*, **Singh S.** Varenicline and cardiovascular events: a perspective review. *Therapeutic Advances in Drug Safety* 2014; 1-6: doi 10.1177/2042098614530421.
3. Beasley R, **Singh S,** Loke YK, Enright P, Furberg CD. Call for worldwide withdrawal of tiotropium Respimat mist inhaler. *BMJ* 2012; 345: e7390.
4. Loke YK, **Singh S.** Risks associated with tiotropium in chronic obstructive pulmonary disease: overview of the evidence to date. *Therapeutic Advances in Drug Safety* 2012; 3: 123-31

Sonal Singh M.D., M.P.H

5. Cavalazzi R, **Singh S**. Inhaled corticosteroids in Chronic Obstructive Pulmonary Disease: How serious is the risk of pneumonia and should it impact use of ICS in COPD. *Current Infectious Disease Reports*. 2011; 13: 296-301.
6. Lexchin J, Arya N, **Singh S**. Gardasil – The New HPV Vaccine: The Right Product, the Right Time? A Commentary. *Healthcare Policy* 2010; 5: 26-36.
7. Cavalazzi R, **Singh S**. Inhaled corticosteroids in Chronic Obstructive Pulmonary Disease: How serious is the risk of pneumonia and should it impact use of ICS in COPD. *Current Infectious Disease Reports*. 2011; 13: 296-301.
8. **Singh S**, Loke YK. A critical analysis of the benefits and drawbacks of inhaled corticosteroids in chronic obstructive pulmonary disease. *International Journal of COPD* 2010; 5: 189-195.
9. **Singh S**, Loke YK. Risk of pneumonia associated with long-term use of inhaled corticosteroids in COPD: A critical review and update. *Current Opinion in Pulmonary Medicine* 2010; 16: 118-122
10. Mills EJ, Ford N, **Singh S**, Eyawo O. Providing Antiretroviral Care in Conflict Settings. *Current HIV/AIDS Report* 2009; 6: 201-9.
11. **Singh S**, Loke YK. Thiazolidinediones and cardiovascular disease- Balancing Benefit and Harm. *Geriatrics and Aging* 2008; 11: 29-35.
12. Orbinski J, Beyrer C, **Singh S**. Violations of human Rights: health practitioners as witnesses. *The Lancet* 2007; 370: 698-704.
13. **Singh S**, Morrell P. What caused Buddha's death? *Ars Medica* 2006; 79-84.
14. Mills EJ, Robinson J, Attaran A, Clarke M, **Singh S**, Upshur RE, Hermann KJ Jr, Yusuf S. Sharing evidence on humanitarian relief. *BMJ* 2005; 331: 1485-6.
15. Mills E, **Singh S**, Warren M, Orbinski J, Upshur RE. Designing research in vulnerable populations: lessons from HIV prevention trials that stopped early. *BMJ* 2005; 331: 1403-1406.
16. **Singh S**. Empathy: Lost or found in medical education? The Learning Curve *MedGenMed* 2005; 7: 3
17. **Singh S**. Impact of long-term political conflict on population health in Nepal. *CMAJ* 2004; 171: 1499-1501.

Peer reviewed Case Reports

1. *Chaukiyal P, **Singh S**, Woodlock T, Dolan JG, Bruner K. Intravascular large B cell lymphoma with multisystem involvement. *Leuk Lymphoma* 2006; 47: 1688-90.
2. Navaneethan SD, Kannan VS, Osowo A, Shrivastava R, **Singh S**. Concomitant intracranial aneurysm and carotid artery stenosis: A therapeutic dilemma. *South Med J*. 2006, 99: 757-8.
3. **Singh S**, Rajpal C, Nannapaneni S, Venkatesh S. Iopamidol myelography-induced seizures. *MedGenMed* 2005; 7: 11.
4. Nautiyal A, **Singh S**, Parmeswaran G, DiSalle M. Hepatic dysfunction in a patient with *Plasmodium vivax* infection. *Med Gen Med* 2005; 7: 1.
5. Navaneethan SD, **Singh S**, Choudhry W. Nodular glomerulosclerosis in non-diabetic patients: Case report and literature review. *J Nephrol* 2005; 18: 613-615.
6. Nautiyal A, **Singh S**, DiSalle M, O'Sullivan J. Painful Horner syndrome as a silent harbinger of carotid dissection. *PloS Med* 2005; 80: 136-137.

Sonal Singh M.D., M.P.H

7. **Singh S**, Nautiyal A, Dolan JG. Recurrent acute pancreatitis possibly induced by atorvastatin and rosuvastatin. Is statin-induced pancreatitis a class effect? *JOP* 2004; 5: 502-504.
8. **Singh S**, Srivastava R, Das V. Formulary Conversion Programs: The need for patient-specific risk assessment. *MedGenMed* 2004; 6: 28.

Correspondence

1. **Singh S**, Suchard MA. Pioglitazone Use and Risk of Bladder Cancer. *JAMA*. 2015 Dec 15; 314(23):2567-8.
2. **Singh S**, Loke YK, Furberg CD. Outpatient management of severe COPD. *NEJM* 2010; 363: 493.
3. **Singh S**, Loke YK. Inhaled corticosteroids: a controversial add-on treatment in COPD. *ERJ* 2010; 36:1-1.
4. **Singh S**, Loke YK, Furberg CD. Tiotropium in Chronic Obstructive Pulmonary Disease *NEJM* 2009; 360: 185-187.
5. Loke Y, **Singh S**. Inhaled Corticosteroids in Patients with Chronic Obstructive Pulmonary Disease. *JAMA* 2009; 301: 1432.
6. Toney JH, Fasick JL, **Singh S**, Beyrer C, Sullivan DJ Jr. Purposeful learning with drug repurposing. *Science* 2009; 325: 1339-40.
7. Serra A, Sechi G, **Singh S**, Kumar A. Wernicke encephalopathy after obesity surgery: a systematic review. *Neurology* 2007; 69: 615.
8. **Singh S**, Arya N, Mills E, Holtz T, Westberg G. Free medical students and doctors detained in Nepal. *Lancet* 2006; 367: 1730.
9. **Singh S**. Where next for China? Rising inequalities in health and wealth are greatest challenge. *BMJ* 2006; 333: 499.
10. Mills E, **Singh S**, Orbinski J, Burrows D. The HIV/AIDS epidemic in Cambodia, The *Lancet Infectious Diseases* 2005; 5: 596-597.
11. **Singh S**, Nautiyal A. Neurological complications of bariatric surgery. *Mayo Clinic Proceedings*. 2005; 80:134-137.
12. **Singh S**. Nepal's war and conflict-sensitive development. *PLOS Med*. 2005;2(1): e19.
13. **Singh S**, Dolan JG. Diagnosis and treatment of Group A pharyngitis strep. *Am Fam Physician*. 2005;71:1064.
14. **Singh S**. Drug-induced pancreatitis might be a class effect of statin drugs. *JOP* 2005; 6: 380.
15. **Singh S**. Special issue on South Asia: focus will be on Asia. *BMJ* 2004; 328: 288.
16. **Singh S**. Letter from the Himalayas. *CMAJ* 2004; 171:309-10.
17. **Singh S**. Post-traumatic stress in former Ugandan child soldiers. *Lancet* 2004; 63: 1648.
18. **Singh S**. Post-Immigrant Refugee Medicine: Children's needs should not be seen in isolation. *BMJ* 2004; 329: 742.
19. **Singh S**. Social and economic justice: the road to health. *CMAJ* 2004; 171: 1021.

Development of major curricular offerings.

Sonal Singh M.D., M.P.H

2 credit Course for MD and MPH in comparative effectiveness research for the Johns Hopkins
ICTR 2015-2016

Sonal Singh M.D., M.P.H

Sonal Singh MD, MPH received his MD from Patna Medical College India (1999). He completed internal medicine residency training at Unity Health System, affiliate of Strong Memorial Hospital Rochester, NY. (American Board of Internal Medicine 2005) He obtained an MPH from Johns Hopkins Bloomberg School of Public Health (2008) and completed subsequent research training at the Johns Hopkins Hospital (2012) as a Junior Faculty Research Scholar supported by the National Institute of Health. He was the Associate Director for the Center for Drug Safety and core faculty Evidence Based Practice Center and the Center for Public Health and Human Rights at Johns Hopkins University. He has taught and held faculty appointments at Wake Forest University School of Medicine and Johns Hopkins University. He has received numerous awards including the Senior Scholarship Award from the Unity Health System (2005), Tinsley R Harrison Teaching Award for Education at Wake Forest University in 2007, Master Teacher Award at Wake Forest University (2008), Mid-Atlantic Society of General Internal Medicine Clinician Investigator of the Year Award (2010), the Bruce P Squires Award for the best research paper of the year from the Canadian Medical Association Journal (2011) and the third best student abstract award from the International Society of Pharmacoepidemiology (2013). He conducts clinical research with a focus on evidence synthesis, drug safety and shared decision making. Dr Singh has conducted research in several countries and has published more than 150 academic manuscripts to advance research and clinical care. His research efforts have been supported by the NIH, FDA, Agency for Health Care Research and Quality and the Patient Centered Outcome Institute and various private foundations. His research has been published in *Science*, *NEJM*, *Journal of the American Medical Association*, *Annals of Internal Medicine*, *Lancet* and *the British Medical Journal*, and featured in various outlets including *Nature Medicine*, *NYTIMES*, *CNN*, *Washington Post* and *the Wall Street Journal*. He currently serves on the editorial board of the *Evidence Based Medicine Journal* published by the BMJ, as a panel member of the American College of Chest Physician guideline writing group, and American College of Physicians Health Policy committee (Massachusetts chapter) He has served as a consultant to the World Bank, World Health Organization International Agency for Research Cancer, the Agency for Health Care Research and Quality, pharmaceutical sponsors and research firms and several non-governmental organizations. He is a practicing general internist with a passion for managing patients with complex medical conditions.

EXHIBIT B

Trial Testimony

I have not provided trial testimony.

Expert deposition (last 5 years)

1. US District Court of South Carolina, Charleston; *In Re Lipitor (Atorvastatin Calcium) marketing, sales practices and products liability litigation*, MDL No. 2:14-mn-02502-rmg, April 28, 2015; supplementary deposition, in 2016.
2. US States District Court, Eastern District Court of California; *Kristi Lauris Individually and as Successor in Interest to the Estate of Dainis Lauris; vs Defendants Novartis AG*, Case No. 1:16 cv 00393 –LJO-SAB. Case 2:17-cv-14302-RLR Document 49 Entered on FLSD Docket, 2017.
3. Circuit Court of Camden County, Missouri; *Grace Arlene Rahmoeller v. Walmart Stores, Inc. and Nicholas B. Collins*, Case No.: 15CM-CC00238, April 16, 2018.
4. US District Court, Southern District of Florida, *Dennis McWilliams and Lori McWilliams v. Novartis AG and Novartis Pharmaceuticals Corp.*, Case No. 17-14302, May 2, 2018.
5. *Mary Brufett and Jefferey Brufett, vs Iskra Pusic, MD, Keith E. Stocker Goldstein and Washington University*, Cause No 1622-CC01117 (Division 8), May 10, 2018.
6. US District Court Northern District of California, San Francisco Division; *In Re: Viagra (Sildenafil Citrate) and Cialis (Tadalafil) Products Liability Litigation*, Civil Case No.: 3:16-md-02691-RS, MDL No. 2691, August 9, 2018.

Exhibit 34

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Page 1

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF NEW JERSEY

-----X

IN RE: JOHNSON & JOHNSON TALCUM
POWDER PRODUCTS MARKETING, SALES
PRACTICES, AND PRODUCTS MDL NO:
LIABILITY LITIGATION 16-2738 (FLW) (LHG)

-----X

THIS DOCUMENT RELATES TO
ALL CASES

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VIDEOTAPED DEPOSITION UNDER ORAL EXAMINATION OF
SONAL SINGH, M.D., M.P.H.
January 16, 2019, 9:07 a.m.

- - -

REPORTED BY: JANET M. SAMBATARO, RMR, CRR, CLR

- - -

GOLKOW LITIGATION SERVICES
877.370.3377 ph | 917.591.5672 fax
deps@golkow.com

Sonal Singh, M.D., M.P.H.

<p style="text-align: right;">Page 2</p> <p>1 2 3 4 5 6 Deposition of SONAL SINGH, M.D., M.P.H., 7 held at the Beechwood Hotel, 363 Plantation Street, 8 Worcester, Massachusetts, pursuant to Agreement 9 before Janet Sambataro, a Registered Merit Reporter, 10 Certified Realtime Reporter, Certified LiveNote 11 Reporter, and a Notary Public within and for the 12 Commonwealth of Massachusetts, on January 16, 2019, 13 commencing at 9:07 a.m. 14 15 16 17 18 19 20 21 22 23 24 25</p>	<p style="text-align: right;">Page 4</p> <p>1 APPEARANCES: (Continued) 2 3 TUCKER ELLIS 4 BY: MICHAEL C. ZELLERS, ESQ. 5 515 South Flower Street 6 Los Angeles, California 90071 7 (213) 430-3400 8 michael.zellers@tuckerellis.com 9 Representing the Defendant, Johnson & Johnson, 10 Johnson & Johnson Consumer Companies, Inc. 11 12 13 14 DRINKER BIDDLE AND REATH, LLP 15 BY: KATHERINE MCBETH, ESQ. 16 One Logan Square, Suite 2000 17 Philadelphia, Pennsylvania 19103-6996 18 (215) 988-2700 19 katherine.mcbeth@dbr.com 20 Representing the Defendant, Johnson & Johnson, 21 Johnson & Johnson Consumer Companies, Inc. 22 23 24 - Continued - 25</p>
<p style="text-align: right;">Page 3</p> <p>1 APPEARANCES: 2 3 ASHCRAFT & GEREL, LLP 4 BY: MICHELLE A. PARFITT, ESQ. 5 4900 Seminary Road 6 Alexandria, Virginia 22311 7 (703) 931-5500 8 mparfitt@ashcraftlaw.com 9 Representing the Plaintiffs 10 11 LEVIN PAPANTONIO 12 BY: CHRISTOPHER V. TISI, ESQ. 13 316 South Baylen Street 14 Pensacola, Florida 32502 15 (850) 435-7000 16 ctisi@levinlaw.com 17 Representing the Plaintiffs 18 19 RESTAINO LAW LLC 20 BY: JOHN RESTAINO, ESQ. 21 130 Forest Street 22 Denver, Colorado 80220 23 (303) 839-8000 24 JRestaino@RestainoLLC.com 25 Representing the Plaintiffs</p>	<p style="text-align: right;">Page 5</p> <p>1 APPEARANCES: (Continued) 2 GORDON & REES 3 BY: MICHAEL R. KLATT, ESQUIRE 4 816 Congress Avenue, Suite 1510 5 Austin, Texas 78701 6 (512) 391-0197 7 Representing the Defendants, 8 Imerys Talc America, Inc. 9 10 COUGHLIN DUFFY LLP 11 BY: MARYAM M. MESEHA, ESQ. 12 350 Mount Kemble Avenue 13 Morristown, New Jersey 07962 14 (973) 267-0058 15 mmeseha@coughlinduffy.com 16 Representing Imerys Talc America, Inc. 17 18 TUCKER ELLIS 19 BY: JAMES W. MIZGALA, ESQ. 20 233 South Wacker Drive 21 Chicago, Illinois 60606 22 (312) 624-6300 23 james.mizgala@tuckerellis.com 24 Representing PTI 25</p>

2 (Pages 2 to 5)

Sonal Singh, M.D., M.P.H.

<p style="text-align: right;">Page 6</p> <p>1 APPEARANCES: (Continued)</p> <p>2</p> <p>3 SEYFARTH SHAW LLP</p> <p>4 BY: THOMAS T. LOCKE, ESQ.</p> <p>5 975 F Street, N.W.</p> <p>6 Washington, D.C. 20004</p> <p>7 (202) 463-2400</p> <p>8 Representing PCPC</p> <p>9</p> <p>10 ALSO PRESENT:</p> <p>11 Jody Urbati, Videographer</p> <p>12</p> <p>13</p> <p>14</p> <p>15</p> <p>16</p> <p>17</p> <p>18</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p>	<p style="text-align: right;">Page 8</p> <p>1 E X H I B I T S</p> <p>2 Number Description Page</p> <p>3 Exhibit 11 Letter dated June 1, 2015 21</p> <p>4 Exhibit 12 Email string with top e-mail</p> <p>5 dated December 27, 2018 23</p> <p>6 Exhibit 13 Invoices from Dr. Singh 25</p> <p>7 Exhibit 14 Plaintiffs' Steering Committee's</p> <p>8 Response and Objections to the</p> <p>9 Notice of Oral and Videotaped</p> <p>10 Deposition of Sonal Singh and</p> <p>11 Duces Tecum 28</p> <p>12 Exhibit 15 Article entitled "Ovarian,</p> <p>13 Fallopian Tube, and Primary</p> <p>14 Peritoneal Cancer Prevention</p> <p>15 (PDQ) - Health Professional</p> <p>16 Version 89</p> <p>17 Exhibit 16 Document entitled "Health Canada</p> <p>18 Decision-Making Framework for</p> <p>19 Identifying, Assessing, and</p> <p>20 Managing Health Risks -</p> <p>21 August 1, 2000" 101</p> <p>22 Exhibit 17 Document entitled "Systematic</p> <p>23 Review and Meta-Analysis of the</p> <p>24 Association between Perineal Use</p> <p>25</p>
<p style="text-align: right;">Page 7</p> <p>1 I N D E X</p> <p>2 WITNESS DIRECT CROSS REDIRECT</p> <p>3 SONAL SINGH, M.D., M.P.H.</p> <p>4 By Mr. Zellers 11</p> <p>5 By Mr. Klatt 301</p> <p>6 By Mr. Locke 337</p> <p>7 E X H I B I T S</p> <p>8 Number Description Page</p> <p>9 Exhibit 1 Notice of Oral and</p> <p>10 Videotaped Deposition of</p> <p>11 Sonal Singh and Duces Tecum 13</p> <p>12 Exhibit 2 Rule 26 Expert Report of</p> <p>13 Sonal Singh, MD, MPH 14</p> <p>14 Exhibit 3 Sonal Singh, MD, MPH, FACP,</p> <p>15 curriculum vitae 16</p> <p>16 Exhibit 4 List of references 17</p> <p>17 Exhibit 5 Additional Materials and</p> <p>18 Data Considered 17</p> <p>19 Exhibit 6 Updated Materials List 18</p> <p>20 Exhibit 7 List of Trial Testimony 18</p> <p>21 Exhibit 8 List of Expert Deposition 19</p> <p>22 Exhibit 9 Table 1 AMSTAR 20</p> <p>23 Exhibit 10 Rule 26 Expert Report of</p> <p>24 Sonal Singh, MD, MPH, with</p> <p>25 attachments 21</p>	<p style="text-align: right;">Page 9</p> <p>1 E X H I B I T S</p> <p>2 Number Description Page</p> <p>3 Exhibit 17 (Continued)</p> <p>4 of Talc and Risk of Ovarian</p> <p>5 Cancer" 109</p> <p>6 Exhibit 18 Printout entitled "Ovarian</p> <p>7 Cancer: Risk Factors" 120</p> <p>8 Exhibit 19 Letter dated April 1, 2014 129</p> <p>9 Exhibit 20 IARC Classifications 133</p> <p>10 Exhibit 21 Article entitled "Perineal use of</p> <p>11 talc and risk of ovarian cancer" 143</p> <p>12 Exhibit 22 Article entitled "Genital use of</p> <p>13 talc and risk of ovarian cancer:</p> <p>14 a meta-analysis" 157</p> <p>15 Exhibit 23 Article entitled "Perineal Talc</p> <p>16 Use and Ovarian Cancer, A Systematic</p> <p>17 Review and Meta-Analysis" 172</p> <p>18 Exhibit 24 Article entitled "The Association</p> <p>19 Between Talc Use and Ovarian Cancer,</p> <p>20 A Retrospective Case-Control Study</p> <p>21 in Two US States" 179</p> <p>22 Exhibit 25 Article entitled "Tubal Ligation</p> <p>23 Induces Quiescence in the Epithelia</p> <p>24 of the Fallopian Tube Fimbria" 206</p> <p>25 - Continued -</p>

3 (Pages 6 to 9)

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<p style="text-align: right;">Page 10</p> <p>1 EXHIBITS</p> <p>2 Number Description Page</p> <p>3 Exhibit 26 Article entitled "New Insights</p> <p>4 into the Pathogenesis of Ovarian</p> <p>5 Cancer: Oxidative Stress" 228</p> <p>6 Exhibit 27 Federal Register, Vol. 81,</p> <p>7 No. 243 233</p> <p>8 Exhibit 28 Document entitled "Interpretation</p> <p>9 of Epidemiologic Studies on Talc</p> <p>10 and Ovarian Cancer" 244</p> <p>11 Exhibit 29 Article entitled "Association</p> <p>12 between Body Powder Use and Ovarian</p> <p>13 Cancer: The African American</p> <p>14 Cancer Epidemiology Study (AACES) 261</p> <p>15 Exhibit 30 Article entitled "Does Exposure to</p> <p>16 Asbestos Cause Ovarian Cancer?</p> <p>17 A Systematic Literature Review and</p> <p>18 Meta-analysis" 289</p> <p>19 Exhibit 31 Article entitled "Occupational</p> <p>20 Exposure to Asbestos and Ovarian</p> <p>21 Cancer: A Meta-analysis" 293</p> <p>22 Exhibit 32 Chart 316</p> <p>23</p> <p>24</p> <p>25</p>	<p style="text-align: right;">Page 12</p> <p>1 deposition as an expert for the plaintiffs in the</p> <p>2 Talc MDL; is that correct?</p> <p>3 A. Yes.</p> <p>4 Q. You are familiar with depositions?</p> <p>5 A. Yes.</p> <p>6 Q. You've given a number of depositions in</p> <p>7 your career?</p> <p>8 A. I don't know about a number. Yes, I</p> <p>9 have.</p> <p>10 Q. Can you estimate for us the number of</p> <p>11 depositions that you've given?</p> <p>12 A. I think I've provided that list in the</p> <p>13 last five years.</p> <p>14 Q. I understand. My question is a little</p> <p>15 different.</p> <p>16 How many have you given in your career?</p> <p>17 A. I can't tell you in my career. Maybe</p> <p>18 ten. Approximately.</p> <p>19 Q. Have you ever testified at trial?</p> <p>20 A. No.</p> <p>21 Q. You understand today that I'm going to</p> <p>22 ask you a number of questions and other counsel</p> <p>23 may as well; correct?</p> <p>24 A. Yes.</p> <p>25 Q. Please don't answer any question that</p>
<p style="text-align: right;">Page 11</p> <p>1 PROCEEDINGS</p> <p>2 THE VIDEOGRAPHER: We are now on the</p> <p>3 record. My name is Jody Urbati. I am a</p> <p>4 videographer for Golkow Litigation Services.</p> <p>5 Today's date is January 16, 2019, and the time is</p> <p>6 9:07 a.m.</p> <p>7 This video deposition is being held in</p> <p>8 Worcester, Massachusetts, in the matter of Talcum</p> <p>9 Powder Litigation, MDL No. 2738, for the United</p> <p>10 States District Court, District of New Jersey.</p> <p>11 The deponent today is Sonal Singh,</p> <p>12 M.D., M.P.H.</p> <p>13 Counsel will be noted on the</p> <p>14 stenographic record.</p> <p>15 The court reporter is Janet Sambataro</p> <p>16 and will now swear in the witness.</p> <p>17 SONAL SINGH, M.D., M.P.H.,</p> <p>18 having been duly sworn, after presenting</p> <p>19 identification in the form of a driver's license,</p> <p>20 deposes and says as follows:</p> <p>21 DIRECT EXAMINATION</p> <p>22 BY MR. ZELLERS:</p> <p>23 Q. State your name, please.</p> <p>24 A. Sonal Singh.</p> <p>25 Q. Dr. Singh, we are here to take your</p>	<p style="text-align: right;">Page 13</p> <p>1 you don't understand.</p> <p>2 Can you do that?</p> <p>3 A. Yes.</p> <p>4 Q. If you don't understand a question, let</p> <p>5 me know, and I'll repeat the question or rephrase</p> <p>6 it, so that we can make it clear to you.</p> <p>7 Can you do that?</p> <p>8 A. Yes.</p> <p>9 Q. If you answer a question that I ask,</p> <p>10 then I'm going to assume that you understood it.</p> <p>11 Is that fair?</p> <p>12 A. Yes.</p> <p>13 Q. You are here today pursuant to a Notice</p> <p>14 of Deposition, which we have marked as Exhibit 1.</p> <p>15 (Notice of Oral and Videotaped</p> <p>16 Deposition of Sonal Singh and Duces Tecum</p> <p>17 marked Exhibit 1.)</p> <p>18 BY MR. ZELLERS:</p> <p>19 Q. Is that correct?</p> <p>20 A. Yes.</p> <p>21 MR. ZELLERS: Katherine, when I mark an</p> <p>22 exhibit, I'm going to need to hand them to you.</p> <p>23 MS. MCBETH: Sure.</p> <p>24 MR. ZELLERS: Thank you.</p> <p>25</p>

4 (Pages 10 to 13)

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<p>1 BY MR. ZELLERS: 2 Q. Did you have an opportunity to review 3 Deposition Exhibit 1 before today's deposition? 4 A. Yes. 5 Q. Have you brought with you or provided 6 to counsel for production all materials in your 7 possession that are responsive to the Notice of 8 Deposition? 9 A. I have. 10 MR. ZELLERS: I will mark, as 11 Deposition Exhibit 2, your report in this matter 12 dated November 16 of 2018. 13 (Rule 26 Expert Report of Sonal 14 Singh, MD, MPH marked Exhibit 2.) 15 BY MR. ZELLERS: 16 Q. Is that correct? 17 A. It is. It doesn't have the references. 18 Q. Deposition Exhibit 2 is just a copy of 19 your report itself. It ends at Page 66. 20 Attached to your report were some additional 21 materials; is that right? 22 A. Yeah. Yeah. I just want to make sure 23 because when I refer to the report, I understand 24 it to include references and tables and so on. 25 Q. Your report includes everything that</p>	<p>1 A. Yes. 2 Q. If at any time today you need to look 3 at any of those documents, they're available, and 4 you're free to do that. Understood? 5 A. It is understood. 6 Q. You had attached or provided with your 7 report a curriculum vitae, which I understand has 8 been updated; is that right? 9 A. Yes. 10 MR. ZELLERS: We will mark your updated 11 CV or curriculum vitae as Deposition Exhibit 3. 12 (Sonal Singh, MD, MPH, FACP, 13 curriculum vitae marked Exhibit 3.) 14 MR. ZELLERS: Folks, I believe that 15 Ms. Parfitt has distributed to you, before the 16 deposition, Exhibit 3. 17 BY MR. ZELLERS: 18 Q. Can you tell us, just briefly, in what 19 respect has Exhibit 3 been updated from the CV 20 that was produced with your report in this 21 matter? 22 A. A few publications, and then I was 23 elected to the fellowship of the American College 24 of Physicians on January 1st. So I'm an FACP, 25 and, yes, just a couple of publications,</p>
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<p>1 was produced by plaintiffs' counsel as part of 2 that report; is that right? 3 And, Dr. Singh, I'm going to mark separately 4 a number of the attachments -- 5 A. Okay. 6 Q. -- to your report. Right now, I'm just 7 trying to identify, is the body of your report -- 8 A. Yeah. 9 Q. -- what we have identified and marked 10 as Exhibit 2? 11 MS. PARFITT: And if I may, 12 Mr. Zellers, object. The body of the report, 13 Dr. Singh may include as the body of the report 14 plus all of its attachments. 15 So just so the record is clear, but I 16 understand how you'd like to conduct it, and 17 that's fine. 18 MR. ZELLERS: Understood. 19 BY MR. ZELLERS: 20 Q. Your counsel today has provided us with 21 two bankers boxes of your report, plus all of the 22 references from the report. Is that correct? 23 A. Yes. 24 Q. You also have brought that along with 25 you; is that right?</p>	<p>1 presentations. 2 Q. Is the curriculum vitae that we have 3 marked as Deposition Exhibit 3 complete and up to 4 date? 5 A. Yes. Up to January 3rd. Yes. 6 Q. Of 2019? 7 A. 2019. Yeah. 8 Q. Are there any further additions or 9 corrections that need to be made to that CV? 10 A. No. 11 MR. ZELLERS: Deposition Exhibit 4 is 12 the list of references from your report. And 13 that goes from Page 67 to Page 75. 14 Q. Is that correct? 15 A. Yes. 16 (List of references marked 17 Exhibit 4.) 18 MR. ZELLERS: Deposition Exhibit 5 is 19 also from your report, and it's a listing of 20 additional materials and data considered. 21 (Additional Materials and Data 22 Considered marked Exhibit 5.) 23 BY MR. ZELLERS: 24 Q. Is that right? 25 A. Yes.</p>

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<p style="text-align: right;">Page 18</p> <p>1 MR. ZELLERS: Deposition Exhibit 6 is 2 an updated list of materials that defendants were 3 provided on January 13th of 2019. 4 (Updated Materials List marked 5 Exhibit 6.) 6 BY MR. ZELLERS: 7 Q. Is that correct? 8 A. Yes. 9 MR. ZELLERS: Folks, I need one more of 10 those back. Can I get one more? Thank you. 11 Deposition Exhibit 7 is a listing of 12 the trial testimony and expert deposition 13 testimony that you have provided in the last five 14 years. 15 (List of Trial Testimony marked 16 Exhibit 7.) 17 BY MR. ZELLERS: 18 Q. Is that right? 19 A. Yes. Actually, I have provided them an 20 update, as well, of that. So I don't know if 21 that was with you, but -- 22 Q. You have brought with you today an 23 updated list of expert deposition testimony for 24 the last five years? 25 A. Yes. No. 7 is the update.</p>	<p style="text-align: right;">Page 20</p> <p>1 testimony list, several additional documents that 2 counsel for plaintiffs has indicated are 3 responsive to the deposition notice. 4 Let me mark these. I have not had a chance 5 to look at them yet substantively. 6 THE WITNESS: Sure. 7 MR. ZELLERS: But I will and may, at a 8 later time today, have some questions for you. 9 THE WITNESS: Actually, I will say 10 there's a substantive document that's not here. 11 That's the table of rating that I created for the 12 report, and that should be part of the report. 13 MR. ZELLERS: Let me see if I can find 14 that. 15 BY MR. ZELLERS: 16 Q. It would be helpful to have that marked 17 as well; is that right? 18 A. Yes. 19 MR. ZELLERS: I will mark, as 20 Deposition Exhibit 9, the Amstar rating of 21 reviews, Pages 77 and 78 from your full report. 22 (Table 1 AMSTAR marked 23 Exhibit 9.) 24 BY MR. ZELLERS: 25 Q. Is that right?</p>
<p style="text-align: right;">Page 19</p> <p>1 MR. ZELLERS: We will mark the updated 2 trial testimony list as Deposition Exhibit 8. 3 (List of Expert Deposition 4 marked Exhibit 8.) 5 MR. ZELLERS: And I understand that's 6 out of order, but I premarked one other exhibit. 7 BY MR. ZELLERS: 8 Q. What is the difference between 9 Deposition Exhibit 8, your updated list of 10 deposition testimony, and Exhibit 6, which is the 11 list of testimony you provided with your report 12 in November? 13 A. Yes. So there's an updated deposition 14 in a medical-legal case regarding standard of 15 care. 16 Q. You've added that -- 17 A. Yes. 18 Q. -- to -- 19 A. No. 7. 20 Q. -- what we have marked as Deposition 21 Exhibit 8? 22 A. Yes, it is. 23 Q. In addition to the materials that we 24 have marked already, which were provided, other 25 than the updated CV and the updated expert</p>	<p style="text-align: right;">Page 21</p> <p>1 A. Thank you. 2 MR. TISI: That was No. 9? 3 MR. ZELLERS: No. 9. 4 Let's go off the stenographic record. 5 You can keep the video going. 6 (Discussion off the stenographic record.) 7 MR. ZELLERS: Let's go back on the 8 stenographic record here. 9 Doctor, counsel for plaintiffs have 10 requested, and I am agreeable to marking a 11 complete copy of your report, including all of 12 the reference list and other materials that we've 13 marked individually, so the complete copy of your 14 report with all attachments, we will mark as 15 Deposition Exhibit 10. 16 (Rule 26 Expert Report of Sonal 17 Singh, MD, MPH, with attachments marked 18 Exhibit 10.) 19 BY MR. ZELLERS: 20 Q. Have we, though, marked individually 21 your complete record -- strike that. 22 Have we marked individually your complete 23 report prior to marking Exhibit 10? 24 A. Yes. 25 (Letter dated June 1, 2015</p>

6 (Pages 18 to 21)

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<p>1 marked Exhibit 11.)</p> <p>2 BY MR. ZELLERS:</p> <p>3 Q. The documents that were produced by</p> <p>4 counsel this morning, Deposition Exhibit 11, is a</p> <p>5 June 1st, 2015 letter with Janssen</p> <p>6 Pharmaceuticals at the top to you from a</p> <p>7 Dr. Zanca. Is that right?</p> <p>8 A. Yes.</p> <p>9 Q. Is this inviting you to a program?</p> <p>10 A. Yes. Consultation for a panel on</p> <p>11 products discussion manufactured by Johnson and</p> <p>12 Janssen Pharmaceuticals.</p> <p>13 Q. You're producing this in response to</p> <p>14 the request asking for all communications between</p> <p>15 yourself and any Johnson & Johnson company; is</p> <p>16 that right?</p> <p>17 A. That's what I understood it to be,</p> <p>18 but -- yeah.</p> <p>19 Q. You've gone and you've made a search,</p> <p>20 and in the search for additional records</p> <p>21 responsive to the Notice of Deposition, which we</p> <p>22 marked as Exhibit 1, you have brought these</p> <p>23 additional documents that we're marking here; is</p> <p>24 that correct?</p> <p>25 A. Well, I wouldn't say I made a search.</p>	<p>1 A. Yes.</p> <p>2 MS. PARFITT: And for the record,</p> <p>3 Mr. Zellers, and we can go ahead and redact the</p> <p>4 copy later, but just so the record is clear, that</p> <p>5 communication at the top to me from Dr. Singh was</p> <p>6 simply, we asked him, do you have any</p> <p>7 communications, and then he sent it to me.</p> <p>8 MR. TISI: We'll redact the part with</p> <p>9 your agreement.</p> <p>10 MR. ZELLERS: Yes. We can do that at a</p> <p>11 break --</p> <p>12 MS. PARFITT: At a break.</p> <p>13 MR. ZELLERS: -- or, you know, at the</p> <p>14 conclusion --</p> <p>15 MS. PARFITT: I appreciate that. Thank</p> <p>16 you.</p> <p>17 MR. ZELLERS: -- of the deposition.</p> <p>18 BY MR. ZELLERS:</p> <p>19 Q. Do you -- strike that.</p> <p>20 The date of your e-mail at the bottom of</p> <p>21 Page 1 is December 13th of 2018; is that right?</p> <p>22 A. Yes.</p> <p>23 Q. You had been retained as an expert?</p> <p>24 A. Yes.</p> <p>25 Q. And had submitted, in fact, your expert</p>
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<p>1 I sort of read it, you know, decided, okay, what</p> <p>2 other additional things that are requested and,</p> <p>3 you know, recalled that I had had this</p> <p>4 interaction with Johnson & Johnson employees.</p> <p>5 Q. Are you comfortable that you have</p> <p>6 brought with you today all of the documents that</p> <p>7 are responsive to the Notice of Deposition?</p> <p>8 A. Yes.</p> <p>9 (Email string with top e-mail</p> <p>10 dated December 27, 2018 marked Exhibit 12.)</p> <p>11 MR. ZELLERS: All right.</p> <p>12 BY MR. ZELLERS:</p> <p>13 Q. Deposition Exhibit 12 is an e-mail</p> <p>14 string. The very last e-mail is from you to --</p> <p>15 well, it's to Michelle Parfitt. I'm assuming</p> <p>16 that you were forwarding to Ms. Parfitt just the</p> <p>17 e-mail below, which is from you to Mr. Restaino</p> <p>18 and then, apparently, the substantive e-mail is</p> <p>19 at the bottom of the first page of Exhibit 12.</p> <p>20 And this is a communication e-mail from you</p> <p>21 to Lee-May Chen and others; is that right?</p> <p>22 A. Yes.</p> <p>23 Q. The subject is "Up-to-date references."</p> <p>24 And the section on epidemiology and risk factors</p> <p>25 of ovarian cancer; is that right?</p>	<p>1 report that we have marked previously; is that</p> <p>2 right?</p> <p>3 A. Yes.</p> <p>4 Q. In this communication, Exhibit 12, do</p> <p>5 you at all identify yourself as a paid, retained</p> <p>6 expert for the plaintiffs in the talc litigation?</p> <p>7 A. No. This was just a communication</p> <p>8 about references, and I did not.</p> <p>9 MR. ZELLERS: Dr. Singh, the next set</p> <p>10 of documents that you have brought with you and</p> <p>11 that we will mark collectively as Exhibit 13 are</p> <p>12 your invoices.</p> <p>13 (Invoices from Dr. Singh marked</p> <p>14 Exhibit 13.)</p> <p>15 BY MR. ZELLERS:</p> <p>16 Q. The first invoice is dated July 14 of</p> <p>17 2010. There's a total of five invoices.</p> <p>18 The last invoice is from July 11, 2018, to</p> <p>19 November 19, 2018. Is that right?</p> <p>20 A. It should be 2017, not 2010. I'm</p> <p>21 sorry. You mentioned 2010.</p> <p>22 Q. And the date is 2017?</p> <p>23 A. Yeah. I wanted to correct that.</p> <p>24 Q. No. Thank you for correcting that.</p> <p>25 I also have not had a chance to review,</p>

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<p style="text-align: right;">Page 26</p> <p>1 substantively, the invoices. 2 A. Sure. 3 Q. And I don't think we have a complete 4 copy. I'm going to ask you some questions in a 5 bit. 6 A. We do have a complete copy. I mean, in 7 terms of -- 8 Q. No. I understand that Exhibit 13 is a 9 complete copy of your invoices. 10 A. Yeah. 11 Q. That you now have the copy in front of 12 you. I don't have the copy in front of me. Keep 13 it. I'll have some questions for you a bit 14 later. 15 Have we now marked all documents that are 16 responsive to the Notice of Deposition which you 17 have produced here today? And let me withdraw 18 that. 19 Have we now marked all of the documents that 20 you have produced in response to the Notice of 21 Deposition? 22 A. Yeah. And I think that, you know, 23 there were some updated materials that I reviewed 24 that are part of this list. 25 Q. All right. And we need to be more</p>	<p style="text-align: right;">Page 28</p> <p>1 (Plaintiffs' Steering 2 Committee's Response and Objections to the 3 Notice of Oral and Videotaped Deposition of 4 Sonal Singh and Duces Tecum marked Exhibit 5 14.) 6 MR. ZELLERS: Back on the stenographic 7 record. 8 Dr. Singh, at the request of 9 plaintiffs' counsel, we will mark and 10 incorporate, as an Exhibit 14, the objections 11 that plaintiffs have filed to the deposition 12 notice. 13 MS. PARFITT: Thank you. 14 BY MR. ZELLERS: 15 Q. Have we identified and marked all of 16 the documents that you have produced pursuant to 17 the Notice of Deposition? 18 A. We have. 19 Q. To your knowledge, there are no 20 additional documents that you have in your 21 possession to produce; is that right? 22 A. I don't have any additional documents. 23 Q. The report that we have marked as 24 Deposition Exhibit 10, does that contain all of 25 the opinions that you intend to offer at trial?</p>
<p style="text-align: right;">Page 27</p> <p>1 specific -- 2 A. Sure. 3 Q. -- as you understand from doing this 4 before. 5 You are referring to the list of updated 6 materials that was produced about a week ago? 7 A. Yeah. 8 Q. And that is Deposition Exhibit -- well, 9 strike that. 10 Just for the record, it was produced on 11 January 13th of 2019. The updated materials that 12 you have reviewed are listed on Deposition 13 Exhibit 6; is that right? 14 A. I have not reviewed these materials. I 15 was provided these materials. I have reviewed 16 portions of these. I have not had a chance to 17 review all of these materials. 18 Q. Anything else that you have responsive 19 to the deposition notice that we have not marked? 20 A. Give me a second. Let me read. 21 MS. PARFITT: If we can go off the 22 stenographic record for one moment while he's 23 doing it. 24 MR. ZELLERS: Sure. 25 (Discussion off the stenographic record.)</p>	<p style="text-align: right;">Page 29</p> <p>1 A. Actually, it's Deposition Exhibit 2. 2 Q. I understand. 3 A. Sorry. I'm a little confused here. 4 Q. That's fine. We don't want you to be 5 confused. And I asked you in the beginning to 6 tell me if you were getting confused. 7 We have marked Deposition Exhibit 10, which 8 contains all of the attachments -- 9 A. Okay. 10 Q. -- that we have separately marked; is 11 that right? 12 A. Yeah. Yeah. 13 Q. All right. The substance of your 14 report in terms of your written opinions, we have 15 marked separately as Exhibit 2; correct? 16 A. Yes. 17 Q. Does that report, Exhibit 2, and also 18 marked as Exhibit 10, contain all of the opinions 19 that you intend to offer at any trial or hearing 20 in this matter? 21 A. Well, I mean, it's hard to say it 22 contains all the opinions because there have been 23 some updates since then and, you know, science 24 evolves. 25 Q. Go ahead. Finish your answer.</p>

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<p style="text-align: right;">Page 30</p> <p>1 A. Science evolves, and, you know, we 2 update our opinions. So it's not like you offer 3 an updated opinion one day and that stays that 4 way. 5 Q. Dr. Singh, this is our opportunity to 6 ask you questions about the opinions that you 7 have formed in this matter. 8 As of today, does your report, which we've 9 marked as Exhibit 2 and also -- 10 MS. PARFITT: 10. 11 Q. -- Exhibit 10, does that include all 12 of the opinions that you intend to testify to at 13 any trial or hearing of this matter? 14 A. Yes. In terms of the causation 15 opinions, it does. But in terms of what 16 additional evidence has been reviewed or what 17 additional evidence has come up that, you know, 18 supports or refutes that, that might have 19 changed. 20 Q. Dr. Singh, do you have any new or 21 additional opinions today that you intend to 22 offer at any trial or hearing of this matter 23 beyond the opinions that are included in your 24 report which we've marked as Exhibit 2 and 25 Exhibit 10?</p>	<p style="text-align: right;">Page 32</p> <p>1 that you intend to provide at any hearing or 2 trial in this matter? 3 A. No. I'm relying on additional evidence 4 since then that has become available on this. 5 Q. Let's -- I will ask you a new question. 6 Are all of the materials that you are 7 relying on in forming the opinions that you 8 expect to testify to at any hearing or trial, 9 identified either in your report, which we have 10 marked as Exhibit 10, or the updated list of 11 materials, which we have marked as Exhibit 6? 12 A. Yes. 13 MS. PARFITT: And 5. 14 THE WITNESS: Okay. That's the part of 15 the whole report. 16 MR. ZELLERS: Yes. 17 BY MR. ZELLERS: 18 Q. Exhibit 5 had previously been produced 19 as part of your report; is that right? 20 A. Yes. 21 Q. Is your report accurate? 22 A. Yes. 23 Q. Is your report complete? 24 A. Yes, it is. It has some typos, but... 25 Q. As we go along, if there's a typo --</p>
<p style="text-align: right;">Page 31</p> <p>1 A. I'm sorry. I'm just not -- it's not 2 like I don't want to answer. I'm trying to 3 understand. When you say "additional opinions," 4 does it just mean like a causal opinion or does 5 it mean -- 6 Q. Dr. Singh, you have done this before; 7 right? 8 A. Yeah. I'm trying to understand and I'm 9 trying to be responsive. 10 Q. This is the defense opportunity to ask 11 you what opinions you intend to offer at any 12 hearing or trial of this matter. 13 As of today, do you have any additional 14 opinions beyond the opinions that are set forth 15 in your report which you intend to offer at any 16 trial or hearing of this matter? 17 A. I don't -- yeah -- I mean, it's, you 18 know, the opinions that I've offered are included 19 in the report. 20 Q. Does your report identify -- and by 21 "report," we can refer to the report that we've 22 marked as Exhibit 10. 23 A. Mm-hmm. 24 Q. Does that report identify everything 25 that you are relying on in forming the opinions</p>	<p style="text-align: right;">Page 33</p> <p>1 strike that. 2 Are there any typos that are substantive 3 typos? 4 A. No. But sometimes it's we and they. I 5 can point that out at some point in time. 6 Q. Are there any documents that were in 7 your possession that you produced to counsel 8 responsive to the deposition notice that have not 9 been produced here? 10 A. No. Not that I can think of. 11 Q. When were you first contacted by anyone 12 regarding the talc ovarian cancer litigation? 13 A. So this was in 2017 by Attorney John 14 Restaino and Attorney Parfitt. I don't know the 15 exact day, but it has to be the, you know, spring 16 or summer of 2017. Spring or summer. 17 Q. Your invoice, your first invoice is 18 dated July of 2017; is that right? 19 A. Yeah. But, you know, it just covers a 20 period of background. It's not that they 21 contacted me and may have contacted me prior to 22 that. 23 Q. Sometime in the first part of 2017, you 24 were contacted by Mr. Restaino and by 25 Ms. Parfitt; is that right?</p>

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<p>1 A. Yes.</p> <p>2 Q. Anyone else?</p> <p>3 A. No.</p> <p>4 Q. What attorneys have you met with or</p> <p>5 communicated with in the talc ovarian cancer</p> <p>6 litigation other than Ms. Parfitt and</p> <p>7 Mr. Restaino?</p> <p>8 A. So Attorney Chris Tisi, and then I have</p> <p>9 communicated on the phone with Attorney Gates.</p> <p>10 Is that -- no. Margaret?</p> <p>11 Q. Margaret Thompson?</p> <p>12 A. Thompson. Yeah.</p> <p>13 Q. Do you know Margaret Thompson?</p> <p>14 A. I mean, I know her as an attorney. I</p> <p>15 just spoke to her on the phone for 30 minutes.</p> <p>16 Q. Have you ever met in person with</p> <p>17 Ms. Thompson?</p> <p>18 A. No.</p> <p>19 Q. Have you ever had any communications or</p> <p>20 interactions with Ms. Thompson other than the</p> <p>21 30-minute-or-so phone call?</p> <p>22 A. No.</p> <p>23 Q. When was that conversation with</p> <p>24 Ms. Thompson?</p> <p>25 A. I don't know. A couple of days ago.</p>	<p>1 you asked to do?</p> <p>2 A. So to clarify, I don't know I was</p> <p>3 retained at that time.</p> <p>4 I was asked to consult on and provide, you</p> <p>5 know, a review and look at -- look at the</p> <p>6 literature on this topic. So I'm not sure --</p> <p>7 depending on semantics, you can define it as</p> <p>8 being retained or, you know -- I don't think we</p> <p>9 had an "agreement," but I was asked to provide a</p> <p>10 consultation on that matter. And these invoices</p> <p>11 include that consult.</p> <p>12 Q. In the first part of 2017, what were</p> <p>13 you asked by counsel for plaintiffs in the talc</p> <p>14 litigation, ovarian cancer talc litigation, to</p> <p>15 do?</p> <p>16 MS. PARFITT: Objection. Limit your</p> <p>17 response to communications with regard to simply</p> <p>18 the requests, not the conversations.</p> <p>19 A. Yeah. So I was asked to review, you</p> <p>20 know, the literature on talcum powder products</p> <p>21 and ovarian cancer.</p> <p>22 Q. Had you ever done that before?</p> <p>23 MS. PARFITT: Objection. Form.</p> <p>24 A. I mean, when I say "review," yes, I had</p> <p>25 read about talcum powder products and ovarian</p>
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<p>1 Yeah.</p> <p>2 Q. It was in preparation for the</p> <p>3 deposition; is that right?</p> <p>4 A. Yes.</p> <p>5 Q. How much time did you spend with the</p> <p>6 lawyers for plaintiffs preparing for this</p> <p>7 deposition?</p> <p>8 A. With the lawyers, I've spent -- yeah,</p> <p>9 I'd have to go back, maybe five or six hours.</p> <p>10 But, again, I can't be very precise.</p> <p>11 Q. Any other attorneys that you've</p> <p>12 communicated with that you understand to</p> <p>13 represent the plaintiffs other than the attorneys</p> <p>14 that you have identified?</p> <p>15 A. No. Not that I can recall.</p> <p>16 Q. Do you understand that you are -- or</p> <p>17 strike that -- have been retained as an expert by</p> <p>18 plaintiffs in the MDL talc ovarian cancer</p> <p>19 litigation?</p> <p>20 A. Right now, I do. Yes.</p> <p>21 Q. Is there any other ovarian cancer</p> <p>22 litigation matter that you have been retained in?</p> <p>23 A. No.</p> <p>24 Q. When you were retained back in early</p> <p>25 2017 by Mr. Restaino and Ms. Parfitt, what were</p>	<p>1 cancer.</p> <p>2 Q. You were asked to make a systematic</p> <p>3 review of the literature relating to talcum</p> <p>4 powder products and ovarian cancer; is that</p> <p>5 right?</p> <p>6 A. Not necessarily a systematic review,</p> <p>7 but they asked me to, you know, review the</p> <p>8 literature, and I had been reading it from</p> <p>9 other -- from my own reading in different</p> <p>10 journals, and they asked me to, you know, review</p> <p>11 and, you know, provide my own opinion on that</p> <p>12 matter.</p> <p>13 Q. At some point, you were retained,</p> <p>14 agreed --</p> <p>15 A. Yes.</p> <p>16 Q. -- to work with the attorneys for</p> <p>17 plaintiffs; is that right?</p> <p>18 A. Yes.</p> <p>19 MS. PARFITT: Objection. Form.</p> <p>20 Q. Were you ever given any new or</p> <p>21 additional assignment in the MDL talc ovarian</p> <p>22 cancer litigation other than to do a literature</p> <p>23 review?</p> <p>24 MS. PARFITT: Objection. Form.</p> <p>25 A. Well, I mean, I guess I was, you know,</p>

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<p>1 asking the causal question that is the use of 2 talcum powder products a cause of ovarian cancer. 3 Q. You looked at the literature -- 4 A. Mm-hmm. 5 Q. -- to try to determine if you could 6 answer that question; is that right? 7 A. Yeah. So we looked at -- I looked at 8 the literature and, you know, obviously, looked 9 at other documents and performed a methodology, 10 and we can discuss that in detail later. 11 But the primary question of interest is -- 12 was, is the use of perineal use of talcum powder 13 products associated with and causally related to 14 the development of ovarian cancer. 15 Q. That has been the request from 16 plaintiffs' counsel to you in terms of providing 17 expert opinions in this matter; is that right? 18 A. Yes. 19 Q. When were you first asked to prepare a 20 report setting forth your opinions? 21 A. Again, I can't recall the specific 22 timelines. I'm sorry. It's been a while. 23 Q. Were you asked by plaintiffs to assume 24 any facts? 25 A. No. I mean, at that time, you know,</p>	<p>1 that right? 2 A. Yes. 3 Q. How much are you charging per hour for 4 your time in this case? 5 A. \$600 an hour. 6 Q. You have invoices in front of you. 7 What is the total value of the time that 8 you've spent on the talc ovarian cancer 9 litigation, whether that's been billed or not 10 billed, paid or not paid? 11 A. I can't calculate the time. I can 12 calculate -- 13 Q. Can you estimate it for us? 14 A. I don't want to give a number that's 15 inaccurate; right? I mean, these are accurate 16 numbers. But I will just have to sum it up -- 17 Q. Let's try to do this as quickly as we 18 can. 19 A. Yeah. 20 Q. The five invoices that you've marked 21 or -- strike that -- that we have marked as 22 Deposition Exhibit 13 -- 23 A. Mm-hmm. 24 Q. -- does that capture all of your time 25 on the ovarian cancer talc litigation through</p>
Page 39	Page 41
<p>1 and even prior to that, I was reading the 2 literature. I was, you know, agnostic to it. 3 And, yeah, I didn't -- in fact, I didn't 4 form an opinion on this topic until -- until the 5 very end of, you know, 2018. 6 Q. When you say you were "agnostic" -- 7 A. Mm-hmm. 8 Q. -- to this issue, whether or not 9 talcum powder products are associated with 10 ovarian cancer, do you mean that you had not 11 formally come up with or developed any opinions 12 prior to becoming involved as an expert for 13 plaintiffs? 14 MS. PARFITT: Objection. Form. 15 A. Yeah. So my -- what I mean is I had 16 not systematically reviewed the literature to 17 form an opinion whether talcum powder products 18 is, so I had not done the processes required to, 19 you know, develop an opinion. 20 Q. All right. You have now done that and 21 you're here to talk about it; is that right? 22 A. Yes. 23 Q. Plaintiffs' counsel have paid you for 24 your time to review documents, the literature, 25 prepare a report, and render your opinions; is</p>	<p>1 November of last year? 2 A. Yes. 3 Q. Is there any additional time that you 4 have spent on the talcum powder litigation up 5 through November of last year that's not 6 reflected in the invoices we've marked as 7 Exhibit 13? 8 A. No. 9 Q. All right. First invoice, what is the 10 total? 11 A. 9,300. 12 Q. The second invoice, total? 13 A. Twenty, one, zero, zero. 14 Q. 21,000? 15 A. 20,100. 16 Q. Next invoice, total? 17 A. 5,100. 18 Q. Next invoice, total? 19 A. 19,200. 20 Q. Last invoice, total? 21 A. 40,800. 22 Q. Since November of 2018, can you 23 estimate for us the number of hours that you have 24 spent on this matter? 25 A. So, I mean, apart from three to five</p>

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<p>1 hours that I spent with the lawyers, I don't 2 know. Maybe I've spent 10, 15 hours on my own. 3 Maybe more. I just don't have that exact number. 4 I'll have to look. 5 Q. At some point, you will submit an 6 invoice -- 7 A. Yes. 8 Q. -- for your time; is that right? 9 A. After today. Yeah. 10 Q. Have you been disclosed as an expert in 11 any other talcum powder proceeding aside from 12 this case? 13 A. No. 14 Q. What percent of your professional time 15 do you currently spend performing work as a 16 consultant? 17 A. Yeah. It could be -- you know, varies. 18 It could be 20 to 30 percent of my time. 19 Sometimes 20 percent. 20 Q. Has that 20 to 30 percent of your 21 professional time spent working as a consultant, 22 has that been consistent for the past five, ten 23 years? 24 A. Yeah. So, actually, it's been less in 25 the past, sometimes a little more, but, you know,</p>	<p>1 A. Okay. 2 Q. What percentage of income is from 3 consulting on litigation matters? Give us an 4 estimate. 5 A. Okay. Yeah. Maybe 30 percent. I'm 6 doing my best to give you -- 7 Q. Is that your -- you're here to be 8 truthful; correct? 9 A. Yeah. 10 Q. Is 30 percent of your income from 11 consulting on litigation matters, is that your 12 best estimate as you sit here today? 13 MS. PARFITT: Objection. Some clarity 14 as to over what period of time? 15 A. Yeah. Over five years, I mean, that's 16 my best estimate. 17 Q. Is it a little bit more now? 18 MS. PARFITT: Objection. 19 A. Well, over the last year, yes, but over 20 five. 21 Q. Over the last year, what are you 22 working on? You're working on the talc 23 litigation; is that right? 24 MS. PARFITT: Objection. Form. 25 Q. Doctor, did you hear my question?</p>
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<p>1 overall, I would average out, you know, sort of 2 as I was preparing over the last five years, it 3 would probably be 15 to 20 percent, but, you 4 know -- 5 Q. Currently, though, best estimate is 20 6 to 30 percent; is that right? 7 A. Over the last six months. Yes. 8 Q. What percent of your income is from 9 consulting on litigation matters? 10 A. Again, I can't give you my gross 11 income. I mean, I -- 12 Q. I don't want your gross income. I'm 13 asking just for -- I just want to know a 14 percentage of your income that comes from 15 consulting in litigation cases. 16 A. Well, again, you know, consulting is 17 not just litigation for me. As I said, I've 18 consulted, you know, including for J&J, Eli 19 Lilly, others, that's, you know, on my CV. 20 Overall, and other, you know, insurers. So it's 21 not just -- first of all, it's not litigation 22 consulting that I do. 23 Q. Dr. Singh -- 24 A. Yes. 25 Q. -- listen to my question, if you can.</p>	<p>1 A. Yeah. Yeah. 2 Q. What other litigations are you serving 3 as an expert for? 4 A. Viagra. 5 Q. You're an expert for plaintiffs in 6 Viagra; is that right? 7 A. Yes. 8 Q. What other litigations are you serving 9 as an expert for plaintiffs in? 10 A. None other than that, that I know of. 11 Q. Are you still working as an expert for 12 plaintiffs in the Lipitor litigation? 13 A. That ended several years ago, as far as 14 I recall. 15 Q. You list two Tasigna cases against 16 Novartis. 17 Are you still working on those cases? 18 A. That ended in, I think, in -- yeah, it 19 ended. 20 Q. You list on your expert testimony, 21 2018; is that right? 22 A. Yes. I mean, but I listed everything 23 that was -- I have done in the five years. It 24 doesn't mean that those are ongoing. 25 Q. You are no longer serving as an expert,</p>

12 (Pages 42 to 45)

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<p>1 to your knowledge, in the Tassigna cases; is that 2 right? 3 A. Yes. 4 Q. How about the Rahmoeller versus Walmart 5 litigation, is that still ongoing? 6 A. That stopped, but, you know, it's been 7 a year since I've heard anything, so I don't 8 know. 9 Q. You also provided testimony in a matter 10 of Brufett versus Washington University. 11 Is that still ongoing? 12 A. That has ended. 13 Q. Is it fair to say that all of the cases 14 in which you have been retained in the past -- 15 A. Sure. 16 Q. -- as an expert for plaintiffs 17 involving a pharmaceutical company defendant have 18 involved prescription medications? 19 A. Yeah. Prescription medications, issues 20 of systems. I mean, that's my area of research. 21 Q. How much of your work is for plaintiffs 22 versus defense as a litigation consultant? 23 MS. PARFITT: Objection. Form. 24 A. Yeah. I mean, over the last ten years, 25 I've provided opinions to both sides, but I have</p>	<p>1 A. I don't understand. Like, what is a 2 personal injury? Is it like somebody -- MVA kind 3 of case or -- 4 Q. Well, you've been involved in Lipitor. 5 You have been involved in a number of other 6 litigations. Let me withdraw that question. Let 7 me make it a little more precise. 8 Have you ever been retained in a case 9 involving cosmetic products? 10 A. No. 11 Q. In the preparation of your report, did 12 you review the other expert reports provided by 13 plaintiffs in this MDL litigation? 14 A. I mean, other than those cited, I have 15 not had a chance to review them. 16 Q. The updated materials list that you 17 have produced here today, which we've marked as 18 Exhibit 6, it contains a number of expert reports 19 from plaintiff experts in the MDL talcum powder 20 ovarian cancer litigation; is that right? 21 A. Yes. 22 Q. What is Exhibit 6? It says "Updated 23 materials." 24 Does that mean updated materials that you 25 have reviewed and considered?</p>
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<p>1 not been, you know -- when you say how much of 2 your work, is it time spent or -- 3 Q. In terms of time spent, most of your 4 work is for plaintiffs; is that right? 5 A. I would say, yeah, 70 percent. Yeah. 6 Q. And it can be more than 70 percent; is 7 that right? 8 MS. PARFITT: Objection to form. 9 Objection to form. 10 A. Well, it depends, again, for frame of 11 time and, you know, if you say yes, in the last 12 year, yes. More than -- 13 Q. Last year, it's been more than 14 70 percent -- 15 A. Sure. 16 Q. -- for plaintiffs; is that right? 17 A. Yes. 18 Q. Have you ever been retained in a case 19 involving asbestos? 20 A. No. 21 Q. Have you ever been involved in a 22 case -- strike that. 23 Have you ever been retained in a case 24 involving personal injuries? 25 MS. PARFITT: Objection. Form.</p>	<p>1 A. They were provided to me at some point 2 in time between November 15th, and I haven't 3 even -- I have actually not reviewed any of the 4 expert reports other than those that have been 5 cited in my report. 6 Q. This list of updated materials is 7 something that was provided to you by plaintiffs' 8 counsel; is that right? 9 A. Yes. 10 Q. Have you reviewed any of the materials 11 that are on the updated materials list, which we 12 have marked as Exhibit 6? 13 A. Yeah. I had a chance to review some of 14 them. 15 Q. Which materials that are identified on 16 Exhibit 6, updated materials, have you actually 17 looked at, reviewed, and considered? 18 A. Yeah. So, I mean, I was already aware 19 of the Health Canada assessment and, you know, so 20 that's -- I've reviewed. 21 I have reviewed, obviously, the Up to Date, 22 that child's sent. 23 I have reviewed the state of the science. I 24 have reviewed -- 25 Q. What do you mean "state of science"?</p>

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<p style="text-align: right;">Page 50</p> <p>1 Where is that listed?</p> <p>2 A. No. 2. No. 2.</p> <p>3 Q. All right. You've reviewed Chen Up to</p> <p>4 Date. You have reviewed the second reference,</p> <p>5 Committee on the State of Science.</p> <p>6 A. Yeah.</p> <p>7 Q. Have you reviewed the Evolving</p> <p>8 Paradigms and Research and Care?</p> <p>9 A. Yes.</p> <p>10 Q. The Draft Screening Assessment, Talc</p> <p>11 Health Canada?</p> <p>12 A. Yes.</p> <p>13 Q. The EFSA Science Committee?</p> <p>14 A. Yes.</p> <p>15 Q. The EPA documents that are listed?</p> <p>16 A. No.</p> <p>17 Q. The FDA Ingredients Talc?</p> <p>18 A. No.</p> <p>19 Q. The Fadak Burnola citation?</p> <p>20 A. Yes.</p> <p>21 Q. The Federal Register, Volume 81?</p> <p>22 A. Yes.</p> <p>23 Q. Have you reviewed the Kemp hearing</p> <p>24 opinion and order?</p> <p>25 A. I don't think so.</p>	<p style="text-align: right;">Page 52</p> <p>1 Q. Did you review Talc Information Sheet,</p> <p>2 Health Canada?</p> <p>3 A. Yes.</p> <p>4 Q. Talc Potential Risk of Lung Effects?</p> <p>5 A. Yes.</p> <p>6 Q. Task Force on Science Risk Assessment?</p> <p>7 A. Yes.</p> <p>8 Q. The Weed Reference?</p> <p>9 A. Yes.</p> <p>10 Q. And the Zervomanolakis citation?</p> <p>11 A. Yes.</p> <p>12 Q. Have we covered all of the materials</p> <p>13 that you've reviewed on the updated materials</p> <p>14 list? Is that right?</p> <p>15 A. Yes.</p> <p>16 Q. Have you communicated or had any</p> <p>17 discussions with any of the other plaintiffs'</p> <p>18 experts in the talc ovarian cancer litigation?</p> <p>19 A. No.</p> <p>20 Q. Have you reviewed any deposition or</p> <p>21 trial transcripts from prior talcum powder cases?</p> <p>22 A. Not prior cases, but I reviewed the</p> <p>23 deposition of Dr. Plunkett.</p> <p>24 Q. Plunkett?</p> <p>25 A. Plunkett.</p>
<p style="text-align: right;">Page 51</p> <p>1 Q. The Keys Model Information Bias?</p> <p>2 A. Yes.</p> <p>3 Q. Kunz?</p> <p>4 A. Yes.</p> <p>5 Q. Official Journal of the European Union?</p> <p>6 A. No.</p> <p>7 Q. Qiao, Q-I-A-O?</p> <p>8 A. No.</p> <p>9 Q. Risk Management Scope, Talc Health</p> <p>10 Canada?</p> <p>11 A. No.</p> <p>12 Q. You have not reviewed any of the</p> <p>13 plaintiff expert reports submitted in this</p> <p>14 matter. Is that your testimony?</p> <p>15 A. Yeah. They were provided to me and,</p> <p>16 you know, I formed my opinion independent of</p> <p>17 them.</p> <p>18 Q. Have you reviewed any of the reports</p> <p>19 prepared and submitted by plaintiffs that are</p> <p>20 identified in your updated materials?</p> <p>21 A. No. Except if any of them were cited,</p> <p>22 that's the one that I reviewed it in.</p> <p>23 Q. Yup. Did you review Talc Canada Plain</p> <p>24 Language Summary?</p> <p>25 A. Yes.</p>	<p style="text-align: right;">Page 53</p> <p>1 Q. Have you reviewed any other depositions</p> <p>2 of experts that have been taken in the MDL</p> <p>3 ovarian cancer talcum powder litigation?</p> <p>4 A. No.</p> <p>5 Q. Did you conduct any independent</p> <p>6 investigation to reach your opinions?</p> <p>7 A. I mean, I -- my opinion is independent</p> <p>8 of these.</p> <p>9 Q. As I understand it, what you did is you</p> <p>10 were asked by plaintiffs to review and consider</p> <p>11 and form an opinion regarding the causal</p> <p>12 question. Is that right?</p> <p>13 A. Yes.</p> <p>14 Q. To do that, you went and you reviewed a</p> <p>15 number of different literature sources; is that</p> <p>16 right?</p> <p>17 MS. PARFITT: Objection. Misstates his</p> <p>18 opinion. He indicated he had reviewed some prior</p> <p>19 to that.</p> <p>20 MR. ZELLERS: Ms. Parfitt, just object,</p> <p>21 form. And let's not have speaking objections.</p> <p>22 MS. PARFITT: And you won't find that I</p> <p>23 will. I want to make sure we have an accurate</p> <p>24 record.</p> <p>25 I can wait until the very end and do a</p>

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<p style="text-align: right;">Page 54</p> <p>1 recross, but I'm trying to clean it up. 2 BY MR. ZELLERS: 3 Q. Doctor, go ahead. 4 A. I didn't get the question. Can you 5 repeat? 6 Q. Sure. The question is: You were asked 7 to form an opinion by plaintiffs. You went out 8 and you reviewed the literature. 9 You considered the literature and you 10 formulated an opinion; is that right? 11 A. Yes. 12 MS. PARFITT: Objection. 13 A. And it was an independent opinion. 14 Q. An independent opinion based upon your 15 review of the literature; is that right? 16 A. Yeah. Based upon my review of the 17 literature and the documents and, you know, 18 whatever was available to me. 19 Q. And those -- all of those materials 20 that you reviewed, considered and relied upon 21 have been included in the exhibits that we've 22 marked in this deposition; is that right? 23 A. That is correct. 24 Q. Was there anything that you asked 25 plaintiffs' counsel for to prepare your report</p>	<p style="text-align: right;">Page 56</p> <p>1 not necessarily the ones who may have helped me 2 in printing articles. 3 Q. My question is: Who helped prepare 4 your report other than yourself? 5 MS. PARFITT: Objection. Objection. I 6 believe you've asked that. He's answered it. 7 A. Okay. Let me answer. 8 Q. Sure. Go ahead, Doctor. Please 9 answer. 10 A. I prepared my report. 11 Q. I understand you prepared your report. 12 My question is: Did anyone assist you in 13 preparing your report? 14 MS. PARFITT: Objection. 15 A. No. 16 Q. You were provided some materials by 17 plaintiffs' counsel; is that right? 18 A. Yes. 19 Q. You reviewed some of those materials, 20 but not all of those materials; is that right? 21 A. Yes. 22 Q. In terms of the references, Exhibit 4. 23 And that is identified as Pages 67 through 75 in 24 your full report that we marked as Exhibit 10. 25 But looking at your references, Exhibit 4,</p>
<p style="text-align: right;">Page 55</p> <p>1 that you were not provided with? 2 A. No. 3 Q. Did anyone assist you in the 4 preparation of your report? 5 A. Well, I may have asked them to print, 6 like, these things and, you know, I may have 7 asked my -- I had means to print some articles 8 when I was preparing that. 9 Q. Do you have a staff? 10 A. Yes. 11 Q. All right. Who is your staff? 12 A. I have several staff. I have, you 13 know, three offices. 14 Q. So you have three offices? 15 A. Yes. 16 Q. In those three offices, do you have 17 folks who help you? 18 A. Yeah. 19 MS. PARFITT: Objection to form. 20 Q. Do you have folks who do research? 21 MS. PARFITT: Objection. Form. 22 A. So, I mean -- so I have a dual 23 appointment in my research, and so I have 24 clinical staff and my research staff. I have 25 people who work with me on projects. They are</p>	<p style="text-align: right;">Page 57</p> <p>1 some of these references were provided by counsel 2 for plaintiffs to you; is that right? 3 MS. PARFITT: Objection. 4 A. Yes. 5 Q. Some, you went out and found on your 6 own; is that right? 7 A. Well, it's not that way. It's the 8 majority of the references, I would say 9 95 percent of, are my own work, and, you know, I 10 had questions about the product and the 11 mechanism, what additional documents were 12 available. 13 And that's a process. And documents were 14 provided, and they need to be cited and are 15 cited. 16 Q. Are you able to tell us, of the 17 references that you cite, Deposition Exhibit 4, 18 which ones came from plaintiffs' counsel and 19 which ones you came up with on your own? 20 MS. PARFITT: Objection. Form. 21 A. Sure. 22 Q. You could do that if we went through 23 one by one? 24 A. Yeah. 25 Q. Let me ask you the same question with</p>

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<p>1 respect to the additional materials and data 2 considered, Exhibit 5. 3 Do you see that? 4 A. Yes. 5 Q. What's the difference between 6 Exhibit 4, references, and Exhibit 5, additional 7 materials and data considered? 8 A. So as I went about and did my, you 9 know, systematic review and, you know, umbrella 10 review, I gathered all the materials and, you 11 know, I included studies and data that provided 12 original data on the causal question that we 13 discussed. 14 Q. Doctor, my question was simply, what's 15 the difference between references and additional 16 materials and data considered? 17 A. So the additional materials are those 18 that were, I would say, you know, reviewed, were 19 still reviewed in forming the opinion, but they 20 are not -- they don't -- they don't form the 21 basis of my opinion. 22 Q. The materials that you relied on in 23 forming your opinion are what you've set forth as 24 your references, Exhibit 4; is that right? 25 MS. PARFITT: Objection.</p>	<p>1 additional materials and data considered, items 2 that are listed in Exhibit 5? 3 A. By reviewed and considered, I mean, 4 have I read every word of it? No. I reviewed 5 and considered. 6 Q. Who prepared the additional materials 7 and data considered list? 8 MS. PARFITT: Objection. 9 A. I prepared the list, but I asked them 10 also to help me with what materials they had 11 sent. 12 Q. The lawyers for plaintiffs; is that 13 right? 14 A. Yes. 15 Q. So in your documents, you do have a 16 listing of the materials that were provided to 17 you by plaintiffs' counsel for consideration; is 18 that right? 19 MR. LOCKE: Objection. Misstates the 20 testimony. 21 A. I'm sorry. Can you repeat? 22 Q. Sure. The question is: You do have, 23 because you requested it, a listing of the 24 documents and materials that were provided to you 25 by plaintiffs' counsel for you to consider;</p>
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<p>1 A. Yeah. I mean, and then things that, 2 you know -- obviously, for the report, it is the 3 references. Yeah. 4 I did rely on these to review them and, you 5 know -- 6 Q. Did you -- strike that. 7 MS. PARFITT: For the record, that was 8 Exhibit 5. 9 MR. ZELLERS: Well, no -- well, the 10 references is Exhibit 4. The additional 11 materials and data considered is Exhibit 5. 12 MS. PARFITT: Correct. 13 BY MR. ZELLERS: 14 Q. So looking at Exhibit 5, additional 15 materials and data considered, were some of these 16 materials provided to you by counsel for 17 plaintiffs? 18 A. Yeah. They may have been. These are 19 data considered. So I'm not as familiar with 20 these as -- 21 Q. Have you -- are you finished? 22 A. Yeah. I'm not -- I mean, I reviewed 23 them. I, you know -- 24 Q. Is it your testimony that you have 25 reviewed and considered each and every one of the</p>	<p>1 correct? 2 MS. PARFITT: Objection. Misstates his 3 testimony. 4 He didn't say he got a list. 5 MR. ZELLERS: Okay. Ms. Parfitt, 6 please, form, foundation. You know, he can 7 testify, and whatever he's testified to, it's 8 part of the record. 9 MS. PARFITT: Sure. And, Mr. Zellers, 10 I am not trying to interrupt your deposition, 11 trust me on that, but I do want some clarity to 12 the record. 13 MR. ZELLERS: Great. That's what we're 14 doing right here. 15 MS. PARFITT: Well -- 16 MR. ZELLERS: We've now asked the 17 question two or three times. 18 BY MR. ZELLERS: 19 Q. Do you have the question? 20 MS. PARFITT: It's a little different. 21 But go ahead. 22 A. So I had asked for additional materials 23 in understanding the causal question between 24 talcum powder products and ovarian cancer. 25 Q. What additional materials did you</p>

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<p>1 request?</p> <p>2 A. I requested additional materials</p> <p>3 regarding what are the constituents of talcum</p> <p>4 powder products. I -- you know, additional</p> <p>5 materials regarding testing of talcum powder</p> <p>6 products -- I -- you know, anything to, you know,</p> <p>7 enhance my understanding whether there's evidence</p> <p>8 to support or refute what we are seeing in the</p> <p>9 epidemiologic studies about an increased risk of</p> <p>10 ovarian cancer with talcum powder products.</p> <p>11 Q. When you requested these materials,</p> <p>12 testing materials, ingredient materials and any</p> <p>13 other materials, did you want to see all of the</p> <p>14 materials that were available so that you could</p> <p>15 form your opinion?</p> <p>16 MS. PARFITT: Objection. Form.</p> <p>17 A. All is -- you know, there's only so</p> <p>18 many hours. I mean, you know, I think I wanted</p> <p>19 to see as much as, you know, was relevant to</p> <p>20 forming an opinion.</p> <p>21 Q. Well, you asked for records of testing</p> <p>22 and you were provided with records, and we'll</p> <p>23 take a look at it --</p> <p>24 A. Sure.</p> <p>25 Q. -- that purport to show that there is</p>	<p>1 material, I can tell you, there's not enough time</p> <p>2 to review all of it. I mean, if somebody has,</p> <p>3 that's great. I can't.</p> <p>4 Q. Are you done?</p> <p>5 A. Yes.</p> <p>6 Q. Did you, when you made that request,</p> <p>7 intend for plaintiffs to provide you with all of</p> <p>8 the information that was available related to</p> <p>9 testing or related to ingredients or whatever</p> <p>10 other issues you requested documents on?</p> <p>11 MS. PARFITT: Objection. Form.</p> <p>12 A. Yes.</p> <p>13 Q. All right. In your report, you cite --</p> <p>14 and this is in references -- to the depositions</p> <p>15 of witnesses in the talcum powder litigation.</p> <p>16 For example, and let's take a look at Exhibit 4,</p> <p>17 your references, Cite No. 4 is to the deposition</p> <p>18 of Linda Loretz.</p> <p>19 Did you review this?</p> <p>20 A. Yes, I did.</p> <p>21 Q. And who is she?</p> <p>22 A. I don't recall offhand, who she is.</p> <p>23 Q. Is that information that was provided</p> <p>24 to you by plaintiffs' counsel?</p> <p>25 A. Yes.</p>
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<p>1 asbestos or asbestos has been found in talcum</p> <p>2 powder; correct?</p> <p>3 A. I mean, that's not the only -- that's</p> <p>4 not only --</p> <p>5 Q. Understood.</p> <p>6 MS. PARFITT: Excuse me. Let him</p> <p>7 finish his answer, if you will, please. I'm not</p> <p>8 sure he was done. Appreciate that.</p> <p>9 Q. Are you done?</p> <p>10 A. No. I'm not. I want to finish my</p> <p>11 answer.</p> <p>12 Q. Okay.</p> <p>13 A. So I requested documents because I</p> <p>14 wanted to understand what constitutes talcum</p> <p>15 powder products, and whether it is asbestos or</p> <p>16 whether it is other heavy metals, that's sort of</p> <p>17 a separate answer, and we can discuss that, and</p> <p>18 I'm sure we will.</p> <p>19 But I wanted to understand the constitution</p> <p>20 of the product and, you know, whether there were</p> <p>21 additional studies on, you know, whether it was</p> <p>22 mechanisms that -- so because -- so that's what</p> <p>23 the request was for.</p> <p>24 And the documents were provided. And my</p> <p>25 review, looking at the complexity and volume of</p>	<p>1 Q. Who is Joshua Muscat, reference list,</p> <p>2 Cite No. 5?</p> <p>3 A. I think he did one of the</p> <p>4 meta-analyses. He's an author of one of the</p> <p>5 meta-analyses as well.</p> <p>6 Q. Who is Alice Blount, Cite 27?</p> <p>7 A. Yeah. They did a study on talc and</p> <p>8 also I was deposed on that.</p> <p>9 Q. Did you request that deposition or was</p> <p>10 that provided to you?</p> <p>11 MS. PARFITT: Objection.</p> <p>12 A. I requested information on -- as I</p> <p>13 said, my request wasn't for deposition -- you</p> <p>14 know, all documents that helped me answer the</p> <p>15 causal question.</p> <p>16 Q. Whether they support plaintiffs'</p> <p>17 position or refute plaintiffs' position; is that</p> <p>18 right?</p> <p>19 A. To answer the causal question. That's</p> <p>20 what --</p> <p>21 Q. You wanted, though, all relevant</p> <p>22 documents, whether they supported plaintiffs'</p> <p>23 position or whether they refuted plaintiffs'</p> <p>24 position; correct?</p> <p>25 A. To answer the causal questions. I</p>

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<p>1 don't --</p> <p>2 Q. Can you not answer that question?</p> <p>3 MS. PARFITT: Objection. I believe --</p> <p>4 A. I'm answering your question.</p> <p>5 MS. PARFITT: -- he did.</p> <p>6 Q. My question is: When you requested</p> <p>7 documents from plaintiffs' counsel on various</p> <p>8 topics, did you expect to receive whatever</p> <p>9 documents may support plaintiffs' position and</p> <p>10 whatever documents may refute plaintiffs'</p> <p>11 position?</p> <p>12 A. Yes.</p> <p>13 Q. All right. Who is John Hopkins,</p> <p>14 reference item -- strike that -- reference list,</p> <p>15 Cite 33?</p> <p>16 A. I think it's -- yeah. It's a</p> <p>17 deposition on behalf of J&J, I think.</p> <p>18 Q. Do you know who Mr. Hopkins is?</p> <p>19 A. No, I don't.</p> <p>20 Q. Do you know what role he had with</p> <p>21 talcum powder?</p> <p>22 MS. PARFITT: Objection. Form.</p> <p>23 A. I mean, he was deposed in this</p> <p>24 litigation and he provided testimony.</p> <p>25 Q. The question is: Do you know what role</p>	<p>1 A. So we can -- we can go back to the</p> <p>2 sections where I cite these and then we can</p> <p>3 discuss. Is that okay?</p> <p>4 Q. No. Well, and if you need to -- if you</p> <p>5 can't answer a question, tell me you can't answer</p> <p>6 a question.</p> <p>7 My question is: For these five or six folks</p> <p>8 who you have quoted a snippet from their</p> <p>9 deposition, did you review their entire</p> <p>10 transcript or did you just review an excerpt?</p> <p>11 MS. PARFITT: Objection to the form.</p> <p>12 A. So the answer will be, we have to go</p> <p>13 one by one.</p> <p>14 Q. All right. For Mr. Hopkins, did you</p> <p>15 review his entire deposition?</p> <p>16 A. No.</p> <p>17 Q. For Ms. Pier, did you review her entire</p> <p>18 deposition?</p> <p>19 A. No.</p> <p>20 Q. For Ms. Blount, did you review her</p> <p>21 entire deposition?</p> <p>22 A. I recall, yes.</p> <p>23 Q. Yes, you did?</p> <p>24 A. Yes.</p> <p>25 Q. For Ms. Loretz, did you review her</p>
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<p>1 Mr. Hopkins played in and with talcum powder?</p> <p>2 A. He was providing testimony on behalf of</p> <p>3 the company. Is that --</p> <p>4 Q. Other than that, do you know anything</p> <p>5 about what he did on behalf of the company?</p> <p>6 A. No.</p> <p>7 Q. Do you know what his positions were?</p> <p>8 A. I don't recall.</p> <p>9 Q. Do you know what his duties and</p> <p>10 responsibilities were?</p> <p>11 A. I don't review that as a part of my</p> <p>12 deposition, is to review positions and do</p> <p>13 responsibilities.</p> <p>14 Q. And who is Julie Pier, Item 35?</p> <p>15 A. She was testifying on behalf of Imerys,</p> <p>16 I think.</p> <p>17 Q. Do you know her position?</p> <p>18 A. I don't review -- you know, she was</p> <p>19 testifying for the company, as that's as far as I</p> <p>20 know. Again, I don't know what role she was</p> <p>21 playing and what she does.</p> <p>22 Q. Did you read, for each of these</p> <p>23 depositions that you reference and cite to, did</p> <p>24 you read just that section or did you read the</p> <p>25 entire transcript?</p>	<p>1 entire deposition?</p> <p>2 A. Yes.</p> <p>3 Q. Did -- strike that.</p> <p>4 For Mr. Muscat, did you review his entire</p> <p>5 deposition?</p> <p>6 A. Yes, I did.</p> <p>7 Q. Did you review all of the exhibits to</p> <p>8 those depositions?</p> <p>9 A. Again, those are pages and pages of</p> <p>10 documents. I don't know that -- if I reviewed</p> <p>11 every single page of it.</p> <p>12 Q. Is it your practice, outside of</p> <p>13 litigation, to rely on excerpts of deposition</p> <p>14 testimony?</p> <p>15 A. Well, I mean, when you say "excerpts of</p> <p>16 depositions," when I reviewed evidence, when I</p> <p>17 try to gather evidence, as I said, you know, I</p> <p>18 was trying to answer the causal question; I try</p> <p>19 to gather all relevant evidence to the relevant</p> <p>20 causal question at hand.</p> <p>21 And sometimes these are unpublished</p> <p>22 documents, and sometimes these are regulatory</p> <p>23 documents and sometimes, as is in this case, they</p> <p>24 are depositions. And this approach is quite</p> <p>25 consistent with other -- other approaches, such</p>

18 (Pages 66 to 69)

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<p>1 as those conducted by, you know, Health Canada. 2 I mean, they clearly state that, you know, 3 you gather all relevant available evidence. 4 Q. That was your goal; is that right? 5 A. Yes. 6 Q. Did Health Canada review deposition 7 testimony of company witnesses, to your 8 knowledge? 9 A. Well, they were not available to them. 10 Q. When you practice, outside of being a 11 litigation consultant, do you rely on excerpts of 12 deposition testimony? 13 A. Well, again, you know, outside of this, 14 when I do papers -- I mean, I do include 15 unpublished or whatever you can collect, 16 whether -- whether it's excerpts of -- I mean, I 17 haven't -- if I look at my past papers, I can't 18 say that I've used excerpts of deposition 19 transcripts. 20 Q. Did -- strike that. 21 You also cite company documents in your list 22 of references; is that right? 23 A. Which one is that? 24 Q. Exhibit 4. 25 A. Which company?</p>	<p>1 as humanly possible. 2 Q. My question is a little more specific. 3 I'm talking now just about any documents produced 4 by Johnson & Johnson defendants or any documents 5 produced by Imerys defendants. 6 You do cite to several of those in your 7 reference list; correct? 8 A. Yes. 9 Q. You were provided those documents by 10 counsel for plaintiffs; correct? 11 A. Yes. 12 Q. Were you provided a large set of 13 materials, company documents from the J&J 14 defendants and from the Imerys defendants, or 15 were you provided with select documents? 16 MS. PARFITT: Objection. Form. 17 A. I mean, these are company documents. I 18 mean, what is the difference between the two? 19 Like explain to me by example. 20 Q. Were you provided a box of J&J 21 documents or documents produced by J&J for your 22 review by plaintiffs' counsel? 23 MS. PARFITT: Objection. Form. 24 A. I don't know. I mean, they provided 25 documents. I see them as documents. I don't see</p>
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<p>1 Q. Well, for example, Item 116 refers to 2 an Imerys document, item 63 refers to a document 3 or set of documents produced by the 4 Johnson & Johnson defendants; correct? 5 A. What was the second one? I'm sorry. 6 You said 116 and then? 7 Q. Yes. Sixty -- 8 MS. PARFITT: 63. 9 Q. 63. 10 A. I'll have to go back and see what do 11 they cite about, to refresh my memory. 12 Q. As you sit here, you don't remember 13 what those documents are, do you? 14 A. Yeah. Yeah. I'd have to go back. 15 Q. Is that correct? 16 A. Yeah. I mean, I have to go back to my 17 report and see them. 18 Q. My question is: Did plaintiffs' 19 counsel provide you with a large set of J&J 20 and Imerys company documents and you went through 21 and whittled them down, or did they provide you 22 with select documents? 23 MS. PARFITT: Objection. Form. 24 A. Well, I mean, I feel it's a large set. 25 As you can see, I've reviewed, you know, as much</p>	<p>1 a difference between. You can -- you know, you 2 can make that connection. 3 Q. Let me do it this way. 4 A. Sure. 5 Q. Are the documents that you reviewed 6 relating to those produced by J&J or produced by 7 Imerys, do you list those in your references, 8 Exhibit 4, and your additional materials and data 9 considered, Exhibit 5? 10 A. They are listed. Yes. 11 Q. All right. When you are doing your day 12 job, outside of your litigation consulting work, 13 do you rely on internal company documents? 14 MS. PARFITT: Objection. Form. 15 A. I mean, I have relied on company 16 documents. When you say "internal company 17 documents," that's, you know -- yeah. I have 18 relied on company documents. We have relied on 19 company trial registries for publications. We 20 have relied on -- whether you're talking about 21 company communication, that's different. 22 But in terms of if we have data available 23 from the company, there's no reason not to rely 24 on that. 25 Q. I'm talking about company</p>

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<p style="text-align: right;">Page 74</p> <p>1 communications, the types of documents that you 2 cite from or produced by J&J and by Imerys in 3 your reference list. 4 Those are not the types of materials that 5 you typically would rely on if you were doing a 6 study for publication; correct? 7 MS. PARFITT: Objection. Form. 8 A. And, again, I've just said that, you 9 know, I gathered all the relevant evidence, as 10 would -- you know, as a methodology that's 11 acceptable and considered. 12 But, you know, in my previous reviews, I've 13 not had access to -- access to those documents. 14 And that's the only -- that's the only place 15 where you can get access to these documents. 16 Q. The answer to my question is no, you 17 know, when you publish articles, you do not rely 18 on internal company documents or communications 19 as you are in this litigation matter; correct? 20 MS. PARFITT: Objection. Form. 21 A. The reason is because there's a 22 confidentiality order. And so you can't say you 23 can't publish articles when you can't access 24 them. I mean, there's a chicken and egg, here, 25 right?</p>	<p style="text-align: right;">Page 76</p> <p>1 testimony. 2 A. I've already stated that when I publish 3 articles, the approach is to gather all relevant, 4 available evidence. 5 And I have, in fact -- you can go back at my 6 articles -- and included data from company 7 documents in various systematic reviews and 8 meta-analyses. So this idea that I have not 9 relied on company documents is -- you know, is 10 not. 11 The question is about deposition transcripts 12 and communiques. Those are generally not 13 available in the published domain, and even for 14 this particular instance, you know, for there's a 15 confidentiality order. I'm just trying to 16 explain what happens. 17 Q. So that our record is clear, when you 18 talk about internal communiques, we're talking 19 about internal communications, in this case, 20 materials that you have been provided by 21 plaintiffs that have been produced by J&J and by 22 Imerys. 23 Those are not the types of documents that 24 you typically have available and rely upon in 25 your published work; correct?</p>
<p style="text-align: right;">Page 75</p> <p>1 Q. Understood. 2 The answer, though, to my question is yes; 3 correct? 4 MS. PARFITT: Objection. Form. 5 A. The reason is because these 6 documents -- 7 Q. Doctor, you need to answer the 8 question. 9 MS. PARFITT: Wait, Mr. Zellers. 10 Excuse me. Let the witness answer the question. 11 MR. ZELLERS: I'm asking him to answer 12 the question and then I'll be happy to move on. 13 MS. PARFITT: No. You're telling him, 14 say yes. He's trying to answer your question. 15 Ask him again. He'll answer the 16 question. He's done it twice. 17 Q. Do you need me to repeat the question? 18 A. Yes, please. 19 MR. ZELLERS: Could you read the 20 question? 21 I'll ask it again. 22 Q. Dr. Singh, when you publish articles, 23 you do not rely on internal company documents; 24 correct? 25 MS. PARFITT: Objection. Misstates his</p>	<p style="text-align: right;">Page 77</p> <p>1 MS. PARFITT: Objection. Misstates his 2 testimony. 3 Q. Is that correct, Doctor? 4 MS. PARFITT: Objection. Misstates his 5 testimony. 6 A. These are just not available to form an 7 opinion in the published domain. 8 Q. You have an additional -- 9 THE WITNESS: Can I take a break? 10 MR. ZELLERS: Sure. Of course. At any 11 time. 12 THE WITNESS: Sorry about that. 13 MR. ZELLERS: No. That's fine. 14 THE VIDEOGRAPHER: Off the record. 15 10:22 a.m. 16 (A recess was taken.) 17 THE VIDEOGRAPHER: Here begins media 18 No. 2 in today's deposition of Sonal Singh, M.D., 19 M.P.H. Back on the record, 10:35 a.m. 20 BY MR. ZELLERS: 21 Q. Dr. Singh, are you ready to continue? 22 A. Yes, I am. 23 Q. When we broke, we were looking at the 24 additional materials and data considered list, 25 which we have marked as Deposition Exhibit 5.</p>

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<p style="text-align: right;">Page 78</p> <p>1 Do you have that?</p> <p>2 A. Yes.</p> <p>3 Q. There are some documents on this list</p> <p>4 that have a preface of Imerys. And if you look</p> <p>5 on Page 87, you list those documents out. And</p> <p>6 then turning to Page 88, there's a series of</p> <p>7 documents that begin with J&J.</p> <p>8 Do you see those?</p> <p>9 A. Yes.</p> <p>10 Q. Did you rely on those documents in</p> <p>11 informing your opinions?</p> <p>12 A. No. I mean, I reviewed -- I don't know</p> <p>13 if I reviewed them in full. I just -- you know,</p> <p>14 they were provided to me.</p> <p>15 Q. That is, the set of documents that were</p> <p>16 provided to you by counsel for plaintiffs; is</p> <p>17 that right?</p> <p>18 A. Yes.</p> <p>19 Q. Are you able, as we sit here, to tell</p> <p>20 me what those documents are?</p> <p>21 A. Yeah. I mean, for example, some of</p> <p>22 them is, you know, duplicative of expert reports</p> <p>23 that are listed here. I don't know by number and</p> <p>24 number, J&J, what that means.</p> <p>25 Q. I'm referring to, for this series of</p>	<p style="text-align: right;">Page 80</p> <p>1 answer the causal question in this case; is that</p> <p>2 right?</p> <p>3 A. Yes.</p> <p>4 MS. PARFITT: Objection.</p> <p>5 Q. You did not have access to internal</p> <p>6 documents of J&J companies or of Imerys; is that</p> <p>7 right?</p> <p>8 A. Yes.</p> <p>9 Q. You asked for those documents, the ones</p> <p>10 that would be relevant to you in forming an</p> <p>11 answer to the question you were asked of</p> <p>12 plaintiffs' counsel; correct?</p> <p>13 A. Yeah. Relevant to consider or support</p> <p>14 or refute. Yeah.</p> <p>15 Q. The documents that were provided to you</p> <p>16 are the documents that appear with a J&J</p> <p>17 preface -- preface and an Imerys preface in the</p> <p>18 reference list, Exhibit 4, and in the additional</p> <p>19 materials and data considered list, Exhibit 5;</p> <p>20 correct?</p> <p>21 A. Yes.</p> <p>22 Q. Once you got those documents and you</p> <p>23 looked at those documents -- and you're not sure</p> <p>24 you looked at all of them; is that right?</p> <p>25 A. Yes. I did not. I mean --</p>
<p style="text-align: right;">Page 79</p> <p>1 questions, just to the other materials that you</p> <p>2 have listed, the ones that begin with Imerys. So</p> <p>3 starting at Item 2 on Page 87. And then also</p> <p>4 including the documents that begin J&J that go</p> <p>5 through Item 23 on Page 88.</p> <p>6 Are you able to identify and tell us what</p> <p>7 those documents are?</p> <p>8 A. I mean, I was provided them. I don't</p> <p>9 know what specifically they are, you know.</p> <p>10 Q. Do you know how they were compiled?</p> <p>11 A. No. I'm not aware of the process.</p> <p>12 Q. Do you know what percentage of internal</p> <p>13 documents, internal to Johnson & Johnson</p> <p>14 companies and to Imerys, have been produced in</p> <p>15 the case that appear on your reliance list?</p> <p>16 A. I'm not aware of that proportion.</p> <p>17 Q. Did you request any additional J&J or</p> <p>18 Imerys documents other than the ones that were</p> <p>19 provided to you by plaintiffs' counsel?</p> <p>20 A. So, it's hard to say request</p> <p>21 additional. I requested question -- materials to</p> <p>22 answer my question. How would I know what</p> <p>23 additional -- you know, I requested materials.</p> <p>24 Q. The way it worked is you asked</p> <p>25 plaintiffs for materials that would be helpful to</p>	<p style="text-align: right;">Page 81</p> <p>1 Q. All right.</p> <p>2 A. -- because it is not possible to look</p> <p>3 at all of them.</p> <p>4 Q. Did you make any follow-up request for</p> <p>5 additional company documents, either documents</p> <p>6 produced by J&J or documents produced by Imerys,</p> <p>7 of plaintiffs' counsel?</p> <p>8 A. I was inundated with these, and I don't</p> <p>9 think it was practical of me to request for</p> <p>10 additional documents.</p> <p>11 Q. In terms of internal company documents</p> <p>12 and communications produced either by</p> <p>13 Johnson & Johnson and by Imerys, the only</p> <p>14 documents you reviewed are the ones that were</p> <p>15 hand selected by lawyers for plaintiffs; is that</p> <p>16 right?</p> <p>17 MS. PARFITT: Objection. Form.</p> <p>18 A. The documents that I reviewed are</p> <p>19 listed, you know, in 4 and 5.</p> <p>20 Q. My question --</p> <p>21 A. I don't know what -- so you're asking</p> <p>22 me to infer what they hand selected; right? I</p> <p>23 mean, whether they provided all, whether they</p> <p>24 provided hand selected, that's not my -- I don't</p> <p>25 know that. You know that. But I don't.</p>

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<p>1 So how can I answer that they were hand 2 selected?</p> <p>3 Q. The company documents that you 4 reviewed, internal company documents, they came 5 from plaintiffs; is that correct?</p> <p>6 A. Yes.</p> <p>7 Q. The updated materials list, we marked 8 that as Exhibit 6.</p> <p>9 Those are materials that were provided to 10 you by plaintiffs' counsel; is that right?</p> <p>11 A. No. I submitted -- I mean, I had 12 access to several of these documents, you know, 13 after the submission of my report, and I reviewed 14 them and I actually sent them some of them. 15 So...</p> <p>16 Q. What documents on this list did you 17 provide to plaintiffs and what documents on this 18 list -- we're looking at Exhibit 6 -- did they 19 provide to you?</p> <p>20 A. Like I had the Fadak article. I had 21 the Health Canada Assessment. They provided the 22 submitted reports. I had the Weed article. They 23 provided the Zervo -- I don't know how to 24 pronounce that name. Yeah.</p> <p>25 So, yeah, I had access to some of these, and</p>	<p>1 Q. It's fair to say you did not rely on 2 the updated materials list in forming your 3 opinions and preparing your report in this case; 4 correct?</p> <p>5 A. Yeah. I did not rely on this, on these 6 materials in preparing the report, but several of 7 these materials are, you know, are helpful in 8 explaining my opinions on this, which were, you 9 know, provided in the report.</p> <p>10 Q. Have you published anywhere your theory 11 that baby powder causes ovarian cancer?</p> <p>12 A. I don't consider it my theory. I mean, 13 several other people have studied this. I don't 14 know how many studies. There have been more than 15 30 studies.</p> <p>16 So I don't consider it my theory. But, no, 17 I have not published a study on it.</p> <p>18 Q. Do you plan to publish on this?</p> <p>19 A. Yes, I do.</p> <p>20 Q. Are those plans underway?</p> <p>21 A. Well, I mean, a lot of it will, again, 22 depend on, you know, the questions you asked 23 about how much of this material will become 24 eventually -- you know, I have signed a 25 confidentiality order. So, you know, how much is</p>
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<p>1 I provided the up-to-date article, and the 2 remainder, they provided.</p> <p>3 MR. KLATT: May I interject? I didn't 4 understand the very first article you said. It 5 sounded like dark.</p> <p>6 THE WITNESS: Fadak.</p> <p>7 MS. PARFITT: F-A-D-A-K.</p> <p>8 THE WITNESS: Fadak, that's a paper --</p> <p>9 MR. KLATT: Okay. I see. Thank you.</p> <p>10 THE WITNESS: That's a 2015 paper.</p> <p>11 MR. KLATT: I saw it. Thank you.</p> <p>12 BY MR. ZELLERS:</p> <p>13 Q. When did you review the materials that 14 are listed on the updated materials list, 15 Exhibit 6?</p> <p>16 A. So, again, maybe we circle back earlier 17 when I said I did not review all of them, like I 18 did not review the expert reports. Yeah.</p> <p>19 Q. Of the materials that you did review, 20 on the updated materials list, when did you 21 review those?</p> <p>22 A. Sometime between December and January.</p> <p>23 Q. It was after you had prepared your 24 written report and produced it; is that right?</p> <p>25 A. Yes.</p>	<p>1 allowed to be published.</p> <p>2 And so, you know, a lot of it will depend 3 on, I guess, the permission of the judge, who 4 allows -- who oversees these kind of -- I would 5 like to, eventually.</p> <p>6 Q. Have you previously published on any 7 topic relating to talc and ovarian cancer?</p> <p>8 A. No.</p> <p>9 Q. Have you conducted any test or 10 experiments to confirm your theory that talc 11 migrates to the ovaries and causes cancer via 12 inflammation?</p> <p>13 A. So, again, that is not a theory that I 14 have propounded, that talc migrates through the 15 ovary, that talc migrates up to cause ovarian 16 cancer, that I have evaluated the epidemiologic 17 studies, which show a causal link between talc 18 and ovarian cancer, and several other 19 investigators, some of them which I cite, have 20 provided evidence that -- of talc-induced, you 21 know, migration.</p> <p>22 So it's not my theory, as you say.</p> <p>23 MR. ZELLERS: Move to strike as 24 nonresponsive. Try to listen.</p> <p>25 Q. My question is, I think, a simple</p>

22 (Pages 82 to 85)

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<p>1 question.</p> <p>2 Have you, Dr. Singh, conducted any test or</p> <p>3 experiments to confirm your statement in your</p> <p>4 report that talc migrates to the ovaries and</p> <p>5 causes cancer via inflammation?</p> <p>6 A. No. I have not done any experiments.</p> <p>7 Q. Can you identify for me a single</p> <p>8 article that identifies inflammation anywhere in</p> <p>9 a woman's reproductive tract resulting from</p> <p>10 external genital talc application?</p> <p>11 MS. PARFITT: Objection. Form.</p> <p>12 A. Can you repeat the question?</p> <p>13 Q. Sure. Can you identify for me a single</p> <p>14 article that identifies inflammation anywhere in</p> <p>15 a woman's reproductive tract resulting from</p> <p>16 external genital talc application?</p> <p>17 A. I mean, again, this is, you know, when</p> <p>18 I reviewed -- so this relates to the biological</p> <p>19 question about talc. And when I reviewed the</p> <p>20 biological evidence, I was on migration and</p> <p>21 inflammation, I was looking for evidence, support</p> <p>22 or refute that.</p> <p>23 And there's studies that show that talc</p> <p>24 migrates through HS, you know, whatever,</p> <p>25 hysterosalpingography, and induces inflammation.</p>	<p>1 A. Yeah. It was available to everyone in</p> <p>2 December.</p> <p>3 Q. Have you looked into what other public</p> <p>4 health authorities have to say about talc and</p> <p>5 ovarian cancer?</p> <p>6 A. Yes.</p> <p>7 Q. Would it be important for you to know</p> <p>8 that CDC does not list talc as a risk factor for</p> <p>9 ovarian cancer?</p> <p>10 MS. PARFITT: Objection. Form.</p> <p>11 A. I mean, it would be important to know,</p> <p>12 you know, various agencies, you know, CDC,</p> <p>13 whatever. I mean, you would like to know of</p> <p>14 many, many agencies.</p> <p>15 But, again, you'd have to -- you'd have to</p> <p>16 see the quality of their judgment. I mean, what</p> <p>17 is their rationale? What are the studies they</p> <p>18 reviewed? What is the data available?</p> <p>19 Just like as you said, what is the data</p> <p>20 available to me to make that judgment, what is</p> <p>21 data available to them? Just because they are</p> <p>22 the CDC doesn't mean that, you know -- yes, I</p> <p>23 would like to know their opinion, but then what</p> <p>24 is the underlying basis of their opinion?</p> <p>25 Q. You're familiar with the CDC; correct?</p>
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<p>1 I mean, the definitive study is not there.</p> <p>2 And, again, I did not do these studies. So</p> <p>3 I can only rely on people who have done such</p> <p>4 studies.</p> <p>5 Q. Can you cite a single study, animal or</p> <p>6 human, that traces externally applied talc up</p> <p>7 through the reproductive tract to the ovaries?</p> <p>8 MS. PARFITT: Objection. Form.</p> <p>9 A. Again, but I do not believe that's</p> <p>10 necessary to, you know, provide my causal opinion</p> <p>11 in support of a causal hypothesis.</p> <p>12 MR. KLATT: Objection. Nonresponsive.</p> <p>13 Q. Is the answer to my question, no?</p> <p>14 MS. PARFITT: Objection. Form.</p> <p>15 A. No, with context.</p> <p>16 Q. Health Canada Risk Assessment, that was</p> <p>17 not something that you included in your</p> <p>18 references or materials considered as part of</p> <p>19 your report; is that right?</p> <p>20 A. Yes. It was not available at that</p> <p>21 time.</p> <p>22 Q. All right. It is listed, the Health</p> <p>23 Canada Risk Assessment is listed in your updated</p> <p>24 materials list that we got over the weekend;</p> <p>25 correct?</p>	<p>1 A. I'm very familiar with the CDC.</p> <p>2 Q. It is an unbiased governmental entity;</p> <p>3 correct?</p> <p>4 A. Well, it would depend on the opinion.</p> <p>5 I mean, you know, we cannot say an entity is</p> <p>6 unbiased. It would depend what is the particular</p> <p>7 opinion -- you know, if the CDC provides</p> <p>8 vaccination. We have to look at the particular</p> <p>9 context.</p> <p>10 Q. Are you aware that the CDC does not</p> <p>11 list talc as a risk factor for ovarian cancer?</p> <p>12 A. Yes.</p> <p>13 MS. PARFITT: Objection.</p> <p>14 Q. Are you aware that the Mayo Clinic does</p> <p>15 not list talc as a risk factor for ovarian</p> <p>16 cancer?</p> <p>17 A. I'm not aware of Mayo Clinic.</p> <p>18 Q. You are aware of NIH; correct?</p> <p>19 A. Yes. I'm funded by the NIH.</p> <p>20 Q. Do you know that NIH does not list talc</p> <p>21 as a risk factor for ovarian cancer?</p> <p>22 A. Yes. And I have been aware of, you</p> <p>23 know, changes in the past to their -- to their</p> <p>24 statements.</p> <p>25 (Article entitled "Ovarian,</p>

23 (Pages 86 to 89)

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<p style="text-align: right;">Page 90</p> <p>1 Fallopian Tube, and Primary Peritoneal 2 Cancer Prevention (PDQ) - Health 3 Professional Version marked Exhibit 15.) 4 MR. ZELLERS: Take a look at Deposition 5 Exhibit 15. 6 MS. PARFITT: Thank you. 7 BY MR. ZELLERS: 8 Q. Deposition Exhibit 15 is a publication 9 from the National Cancer Institute; is that 10 right? 11 A. It is. 12 Q. National Cancer Institute is a leading 13 health authority; is that right? 14 A. Yes. 15 Q. It's a leading cancer research 16 institution in the world? 17 MS. PARFITT: Objection. Form. 18 A. Yes. 19 Q. Have you ever received a grant from the 20 National Cancer Institute? 21 A. I've applied. I have not received any. 22 I am applying again. 23 Q. They fund more cancer research than any 24 organization in the world; correct? 25 MS. PARFITT: Objection.</p>	<p style="text-align: right;">Page 92</p> <p>1 not a risk factor for ovarian cancer? 2 MS. PARFITT: Objection. 3 A. So the National Cancer Institute hasn't 4 opined on that talc is not a causal -- you know, 5 is causally linked to ovarian cancer. It has 6 provided a listing of documents. It has not gone 7 through any systematic process, that I'm aware 8 of, of looking at the epidemiologic data 9 systematically. 10 It has not provided any evidence of 11 inflammation or lack thereof or migration or lack 12 thereof or to even, you know, arrive at this 13 causal hypothesis. 14 Q. Because it's important to look at both 15 sides of an issue; correct? 16 A. Yes. I did look -- so I'm saying that 17 I did look at this and my opinion -- 18 Q. Did you -- 19 MS. PARFITT: Please let him finish. 20 Q. Are you finished? 21 A. I'm saying I did look at this, and I'm 22 aware of this document. 23 Q. Did you cite to the CDC in your report 24 or references? 25 A. I don't -- I wasn't aware of the CDC.</p>
<p style="text-align: right;">Page 91</p> <p>1 A. I don't know that particular number, 2 but -- I just don't know that answer. 3 Q. Are you aware that the National Cancer 4 Institute reviews the peer-reviewed literature as 5 it relates to risk factors for ovarian cancer? 6 MS. PARFITT: Objection. Form. 7 A. Yes. And I don't know how updated they 8 are. Based on the document you've provided me, 9 they have four citations for perineal talc and 10 ovarian cancer. 11 So, again, I'm not questioning the NCI's 12 motivation, but I am -- I am raising, what is the 13 quality of their judgment. 14 Q. Did you consider the CDC's 15 determination that talc is not a risk factor for 16 ovarian cancer in formulating your opinions? 17 A. Yes. 18 Q. Did you consider NIH's determination 19 that talc is not a risk factor for ovarian cancer 20 in formulating your opinions? 21 A. Yes. Because they did not have 22 sufficient information, based on what they 23 provided in their PDQs. 24 Q. Did you consider National Cancer 25 Institute's opinion or conclusion that talc is</p>	<p style="text-align: right;">Page 93</p> <p>1 Q. Did you cite to the NIH in your report 2 or your references? 3 A. I should have. And if it isn't, it is 4 remiss. 5 Q. Did you cite to the National Cancer 6 Institute in your report or references? 7 A. I have to look at it. 8 Q. The National Cancer Institute, in fact, 9 has done an analysis, a very detailed analysis 10 which we have marked as Exhibit 15 to this 11 deposition; correct? 12 MS. PARFITT: Objection to form. 13 A. I don't think it's a detailed analysis 14 of perineal talc and ovarian cancer. 15 There is how many lines? We can look at it 16 and read it together. It's, you know -- it's 15 17 lines. And they have references 41 to 45, which 18 is five references. 19 So I don't know it is a detailed analysis. 20 Q. National Cancer Institute, one of the 21 things that it does is to review peer-reviewed 22 literature as it relates to risk factors for 23 ovarian cancer. Is that right? 24 MS. PARFITT: Objection. Form. 25 A. It does do that.</p>

24 (Pages 90 to 93)

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<p>1 Q. All right. This document, this 2 document that we're looking at from the National 3 Cancer Institute, Exhibit 15, was updated in 4 January of 2019; is that right? 5 A. Yeah. But it doesn't mean the review 6 was updated, because it has no recent citations 7 of studies that have been conducted. 8 Q. We -- 9 A. We should look at the citation. Let's 10 look at it, because we are discussing this 11 document, so we should look at it in detail. 12 Q. Doctor, turn to Page 6. 13 A. No. Let me finish. I'm not finished 14 with this document. 15 MS. PARFITT: Go ahead. Let him 16 finish. 17 Q. Doctor, you have to answer my 18 questions. 19 A. But I haven't answered it. 20 Q. My question is look at Page 6. Can you 21 do that? 22 A. Okay. 23 Q. All right. Page 6 is a section on 24 perineal talc exposure; is that right? 25 A. Yes.</p>	<p>1 A. I don't know if it's the conclusion, 2 but, yes, you read that part of the statement 3 correctly. 4 Q. Why would you rely on Health Canada, 5 but not these other public health organizations? 6 MS. PARFITT: Objection. Misstates his 7 testimony. 8 A. In fact, I did rely on the Health 9 Canada when my report was conducted. So you 10 see -- I relied on the quality of the review and 11 the breadth of my review, which had hundreds of 12 studies, the breadth of review of biological 13 plausibility, the breadth of review of, you know, 14 animal studies, applying the Bradford Hill 15 framework, and then forming an opinion. 16 Q. How -- are you done? 17 A. No. I'm not done. 18 And the Health Canada Assessment came after 19 that. And it so happened their methodology -- 20 methodology -- methodology and opinions are 21 consistent with mine. 22 So it's not that I'm relying on that. I'm 23 just saying that they are consistent and they 24 came to the same conclusions. 25 Q. What materials and analysis was done by</p>
Page 95	Page 97
<p>1 Q. This is part of the National Cancer 2 Institute's publication on ovarian, fallopian 3 tube and primary peritoneal cancer prevention; is 4 that right? 5 A. Yes. 6 Q. On Page 6, the first sentence under 7 perineal talc exposure states, "The weight of 8 evidence does not support an association between 9 perineal talc exposure and an increased risk of 10 ovarian cancer." 11 Is that right? 12 A. Based on what? Based on these 41 to 45 13 citations? Which are an incomplete listing of 14 studies and an incomplete review of the evidence. 15 So I'm just stating that, yes, what is the 16 underlying basis? 17 Q. Doctor -- 18 MS. PARFITT: Wait. Let him finish. 19 He's in the middle of a sentence. 20 A. What is the underlying basis of this 21 opinion? 22 Q. Dr. Singh, my question is: Did I read 23 the conclusion of the National Cancer Institute 24 correctly? 25 MS. PARFITT: Objection.</p>	<p>1 the CDC in determining that talc is not a risk 2 factor for ovarian cancer? 3 MS. PARFITT: Objection. Form. 4 A. I don't have that. 5 Q. What materials were reviewed and relied 6 upon by NIH in determining that talc is not a 7 risk factor for ovarian cancer? 8 A. References 41 to 45. 9 Q. How do you know that that's all that 10 the NIH and National Cancer Institute reviewed? 11 A. Because that's what they cite. 12 Q. Have you been privy to the complete 13 review and analysis of the National Cancer 14 Institute? 15 A. But you just stated that this was the 16 complete review and analysis of the National 17 Cancer Institute? 18 Q. I'm asking you: Do you know what 19 specific studies and materials were reviewed and 20 what analysis was done by NIH and by the National 21 Cancer Institute? 22 A. Yeah. These are the studies that were 23 reviewed. 24 Q. You are assuming that this is the 25 entire analysis and review that was done by the</p>

25 (Pages 94 to 97)

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<p style="text-align: right;">Page 98</p> <p>1 National Cancer Institute; is that right?</p> <p>2 MS. PARFITT: Objection. Form.</p> <p>3 A. I'm not assuming anything. I'm</p> <p>4 assuming that, just as the conclusions that you</p> <p>5 are assuming are definitive, I'm also, you know,</p> <p>6 stating that these are the studies that they</p> <p>7 relied on to form those conclusions.</p> <p>8 So we can't pick and choose, assess</p> <p>9 statement of the excerpt that you -- supports</p> <p>10 your opinion, but then not look at the underlying</p> <p>11 evidence base that supports that opinion.</p> <p>12 Q. But we should consider all of that</p> <p>13 information; correct?</p> <p>14 A. Yeah. And the studies underlying.</p> <p>15 Q. And you did not consider the CDC's</p> <p>16 opinion in your report, did you?</p> <p>17 A. I mean, CDC -- so let's just step back</p> <p>18 a little.</p> <p>19 When I say CDC opinion, I mean, I'm looking</p> <p>20 at original studies. I'm looking at data in</p> <p>21 forming my opinion. I did look at what IARC</p> <p>22 considered and other agencies considered.</p> <p>23 My opinion is based on my review and the</p> <p>24 methodology and I was, you know, obviously,</p> <p>25 taking into account what agencies say, but</p>	<p style="text-align: right;">Page 100</p> <p>1 assessment prior to its publication?</p> <p>2 A. No.</p> <p>3 Q. Have you submitted any comments to</p> <p>4 Health Canada?</p> <p>5 A. No.</p> <p>6 Q. Do you intend to submit any comments to</p> <p>7 Health Canada?</p> <p>8 A. I don't know. I mean, it will depend</p> <p>9 on the timeline and I don't know what their</p> <p>10 timeline is and what my -- you know, I</p> <p>11 haven't -- I haven't thought about it.</p> <p>12 Q. Outside of your litigation consulting,</p> <p>13 do you generally rely on draft assessments by</p> <p>14 regulatory agencies?</p> <p>15 MS. PARFITT: Objection. Form.</p> <p>16 A. Yes. I mean, you know, we look at</p> <p>17 draft assessments on regulatory. There's no</p> <p>18 reason not to.</p> <p>19 Q. Have you ever cited a draft assessment</p> <p>20 by a regulatory agency in any study that you've</p> <p>21 published?</p> <p>22 A. Oh, I've published 200 papers, and I</p> <p>23 can't recall, you know, which one, but I know</p> <p>24 that I have looked at draft assessments by the</p> <p>25 FDA.</p>
<p style="text-align: right;">Page 99</p> <p>1 agencies' opinion is not necessarily the</p> <p>2 underlying basis of my causal opinion.</p> <p>3 Q. Whether it's CDC, NIH, NCI or Health</p> <p>4 Canada; correct?</p> <p>5 A. Yeah. I mean, they're informing. I</p> <p>6 want to look at their thinking and what is the</p> <p>7 quality of their judgment on this.</p> <p>8 Q. You understand Health Canada has simply</p> <p>9 produced a draft assessment; is that right?</p> <p>10 MS. PARFITT: Objection. Form.</p> <p>11 A. Yes.</p> <p>12 Q. We are at the beginning of the public</p> <p>13 comment period; is that right?</p> <p>14 A. I don't know the timeline of that.</p> <p>15 Q. Are you aware that Health Canada can</p> <p>16 take up to two years to take any action or no</p> <p>17 action at all?</p> <p>18 A. Well, I mean, I was not asked a causal</p> <p>19 question on what to do about this. I was just</p> <p>20 asked a question on causality. And I'm not sort</p> <p>21 of -- I'm not privy to their process.</p> <p>22 Q. How did you come to learn of the Health</p> <p>23 Canada Risk Assessment?</p> <p>24 A. News, news documents.</p> <p>25 Q. Were you involved in the risk</p>	<p style="text-align: right;">Page 101</p> <p>1 Q. Have you cited any?</p> <p>2 A. I can't recall and tell you that. It's</p> <p>3 just something I can't recall.</p> <p>4 Q. Are you familiar with the precautionary</p> <p>5 principle?</p> <p>6 A. Yes.</p> <p>7 Q. What is the precautionary principle?</p> <p>8 A. It is to, you know, apply, as my</p> <p>9 understanding, is to warn when there is, you</p> <p>10 know, evidence of a hazard.</p> <p>11 Q. That's your understanding of the</p> <p>12 precautionary principle?</p> <p>13 A. Yeah.</p> <p>14 Q. Do you understand that, as defined by</p> <p>15 Health Canada, a precautionary principle means</p> <p>16 taking a precautionary approach to</p> <p>17 decision-making that emphasizes the need to take</p> <p>18 timely preventative action even in the absence of</p> <p>19 a full scientific demonstration of cause and</p> <p>20 effect?</p> <p>21 A. If you're stating -- well, let's get</p> <p>22 the document out before we --</p> <p>23 Q. Sure. Take a look at deposition</p> <p>24 Exhibit 16.</p> <p>25 (Document entitled "Health</p>

26 (Pages 98 to 101)

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<p style="text-align: right;">Page 102</p> <p>1 Canada Decision-Making Framework for 2 Identifying, Assessing, and Managing Health 3 Risks - August 1, 2000" marked Exhibit 16.) 4 A. Okay. Can you point out which page? 5 Q. Sure. Take a look at Pages 8 and 9. 6 So we identify it for the record, Exhibit 16 is 7 the Health Canada Decision-Making Framework for 8 Identifying, Assessing and Managing Health Risk; 9 is that right? 10 A. Yes. 11 Q. If you go to Page 8 and 9, Section 1.3 12 are the underlying principles for Health Canada; 13 is that right? 14 MS. PARFITT: Objection. 15 MR. TISI: You're looking at the wrong 16 document. You're not looking at the draft 17 assessment. You're looking at the -- 18 MR. ZELLERS: Counsel, I am -- 19 MR. TISI: But you identified something 20 as something different than what it is. 21 MR. ZELLERS: I identified the document 22 as Health Canada Decision-Making Framework for 23 Identifying, Assessing and Managing Health Risk. 24 I'm reading the title of the document. 25 MR. TISI: Okay. I have it wrong. Go</p>	<p style="text-align: right;">Page 104</p> <p>1 precautionary approach. A key feature of 2 managing health risk is that decisions are often 3 made in the presence of considerable scientific 4 uncertainty. A precautionary approach to 5 decision-making emphasizes the need to take 6 timely and appropriately preventative action, 7 even in the absence of a full scientific 8 demonstration of cause and effect." 9 Did I read that correctly? 10 A. Okay. 11 Q. Do you agree that the recommendation by 12 Health Canada does not require a finding of 13 causation like is required in a court; correct? 14 MS. PARFITT: Objection. Form. 15 A. But I mean, that's what they conclude, 16 that there is a cause. We can look at the Health 17 Canada document. 18 Q. Is a guiding principle of the Health 19 Canada Decision-Making and Assessment to use a 20 precautionary approach? 21 MS. PARFITT: Objection. Form. 22 A. Well, no. I mean, precautionary -- 23 they are just defining a precautionary approach. 24 But when they assess talc for its whatever, you 25 know, the talcum powder products, their</p>
<p style="text-align: right;">Page 103</p> <p>1 ahead. 2 MR. ZELLERS: That's okay. 3 A. Wherever we are. 4 Q. No problem, Doctor. 5 MS. PARFITT: We'll orient ourselves. 6 Q. Are we oriented? 7 A. Yeah. I know the document. But the 8 page number. 9 Q. Look at Pages 8 and 9. 10 A. Okay. 11 Q. 1.3 are the underlying principles for 12 Health Canada decision-making. 13 Do you see that? 14 A. Yes. 15 Q. They list out a number of underlying 16 principles on Pages 8 and 9. 17 One of those is to use a precautionary 18 approach; is that right? 19 A. Yes. 20 Q. If you then turn to Page 11, at the 21 bottom, they define use of a precautionary 22 approach; is that right? 23 A. Yes. 24 Q. Health Canada states in this document, 25 which we've marked as Exhibit 16, "Use a</p>	<p style="text-align: right;">Page 105</p> <p>1 particular assessment clearly states it's causal. 2 And we should open that document. We should not 3 talk about it in hypotheticals. 4 Q. On what basis are you relying to state 5 that Health Canada did not use a precautionary 6 approach in assessing talcum powder? 7 MS. PARFITT: Objection. Form. 8 A. No. No. No. Let me answer that 9 question. 10 You were asking about decision-making. 11 Decision-making would be removal of talc, removal 12 of that. 13 But there's two parts to that question about 14 cause and effect. So let's bring the document 15 out and say where they state there is a causal 16 relationship. 17 Why aren't you bringing that document out? 18 I mean, you can't talk about documents without 19 documents. 20 Q. Dr. Singh -- 21 A. Yeah. 22 Q. -- do you have any basis to state 23 that, in evaluating talcum powder, Health Canada 24 did not follow its underlying principle of using 25 a precautionary approach?</p>

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<p style="text-align: right;">Page 106</p> <p>1 MS. PARFITT: Objection. Form. 2 Misstates the evidence. 3 A. Yeah. But that does not preclude at 4 arriving at a causal opinion. Just because you 5 have a precautionary approach, you can still 6 arrive at causal opinion, which they did. 7 So this is -- this principle is not 8 inconsistent with their report on a causal 9 opinion. 10 Q. The standard under a precautionary 11 approach is that decisions can be made even in 12 the absence of a full scientific demonstration of 13 cause and effect; correct? 14 MS. PARFITT: Objection. Form. 15 A. That is a threshold, but that does not 16 preclude the determination of cause and effect, 17 which has been done already. 18 Q. Are you familiar with the Taher 2018 19 publication? 20 A. Taher. I don't know which one. 21 Q. T-A-H-E-R. 22 A. Yes. 23 Q. Are you familiar with that publication? 24 A. Yeah. It was cited in the Health 25 Canada document.</p>	<p style="text-align: right;">Page 108</p> <p>1 A. No. 2 Q. Hold on. Stop. Stop. 3 A. Sure. 4 Q. Just so we're clear, the updated 5 materials list is a list that was created by 6 plaintiffs' counsel; correct? 7 MS. PARFITT: It was based upon 8 materials that we had either sent or we had sent 9 that he also had; correct. 10 MR. ZELLERS: This Exhibit 6 is a list 11 of materials that were provided by plaintiffs' 12 counsel to Dr. Singh, understanding that 13 Dr. Singh has testified that he independently had 14 access to some of the materials. 15 MS. PARFITT: Correct. Including 16 Taher. 17 THE WITNESS: Yeah. And some of them, 18 I added, such as some of the published articles 19 and Health Canada. 20 BY MR. ZELLERS: 21 Q. You have read the Taher 2018 22 manuscript; is that right? 23 A. I mean, I read the -- yeah, I mean, 24 primarily, I read their assessment in Health 25 Canada.</p>
<p style="text-align: right;">Page 107</p> <p>1 Q. Have you reviewed and analyzed that 2 publication? 3 A. I mean, I reviewed it. I don't know if 4 I analyzed it. 5 What do you mean by "analyzed"? 6 Q. You have not included it on your 7 references or additional materials considered or 8 updated materials; is that right? 9 MS. PARFITT: Objection. 10 A. It was part of the Health Canada. It 11 should have been part, because it was part, in my 12 mind, part of the Health Canada Assessment. 13 Q. Can you show me where -- 14 A. Well, I haven't. 15 Q. -- the Taher publication is listed in 16 your updated materials which we marked as 17 Exhibit 6? 18 MS. PARFITT: For the record, we 19 created this list, Mr. Zellers, and part of the 20 Canadian, just for form, and you can inquire. 21 MR. ZELLERS: That's okay. 22 MS. PARFITT: But since we did create 23 Exhibit No. 6, additional materials, we had 24 included, I will tell you, we had given him 25 Taher. He may have found it himself.</p>	<p style="text-align: right;">Page 109</p> <p>1 MR. ZELLERS: Deposition Exhibit -- 2 well, strike that. 3 Q. What you told me, when I asked you 4 about CDC and NIH and NCI, is you got to look at 5 the underlying documents, the underlying studies; 6 is that right? 7 A. Yes. 8 Q. One of the underlying documents and 9 studies on which Health Canada reviewed was the 10 Taher article; is that right? 11 A. Yes. 12 (Document entitled "Systematic 13 Review and Meta-Analysis of the Association 14 between Perineal Use of Talc and Risk of 15 Ovarian Cancer" marked Exhibit 17.) 16 BY MR. ZELLERS: 17 Q. The Taher article is what we have 18 marked as deposition Exhibit 17; is that right? 19 MS. PARFITT: Thank you. 20 MR. TISI: Is it Thayer or Taher? 21 A. It is Taher, T-A-H-E-R. 22 Q. Did you have access to the Taher 2018 23 article before it was published? 24 A. Yes. 25 Q. How did you have access to the Taher</p>

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<p style="text-align: right;">Page 110</p> <p>1 2018 article?</p> <p>2 A. Yeah. I requested access from the</p> <p>3 attorneys, if they had it. They provided it.</p> <p>4 Q. So plaintiffs' attorneys provided you</p> <p>5 with access to the article we've marked as</p> <p>6 Exhibit 17 prior to its publication; is that</p> <p>7 right?</p> <p>8 A. Yeah.</p> <p>9 MS. PARFITT: Objection.</p> <p>10 A. I don't know if it has been published</p> <p>11 yet.</p> <p>12 Q. Did you have access to the appendices</p> <p>13 or supplemental tables referenced in the Taher</p> <p>14 publication?</p> <p>15 A. Yes, I did.</p> <p>16 Q. In your epidemiologic -- strike that.</p> <p>17 Is the Taher publication, which we've marked</p> <p>18 as Exhibit 17, is that peer-reviewed?</p> <p>19 A. It's peer-reviewed, and I assume that</p> <p>20 it's going to be published. And it was reviewed</p> <p>21 by Health Canada. So I mean, it is</p> <p>22 peer-reviewed, is my understanding.</p> <p>23 It is -- I don't know the exact status of</p> <p>24 that manuscript.</p> <p>25 Q. What organization has peer-reviewed the</p>	<p style="text-align: right;">Page 112</p> <p>1 Q. Why did you rely on this article,</p> <p>2 Taher, Exhibit 17?</p> <p>3 MS. PARFITT: Objection to form.</p> <p>4 A. I mean, when you say I relied on, I</p> <p>5 mean, I reviewed the, again, Health Canada</p> <p>6 Assessment. So none of this is in isolation.</p> <p>7 I mean, this is just a part of, you know,</p> <p>8 the body of evidence. You know, my testimony</p> <p>9 relies on -- and my report relies on the evidence</p> <p>10 cited there.</p> <p>11 This is, you know, another meta-analysis</p> <p>12 that, you know, I reviewed the evidence in</p> <p>13 slightly different ways and came to the same</p> <p>14 conclusions and, you know, also did a causal</p> <p>15 analysis. So it's sort of, you know, you have to</p> <p>16 review what evidence comes out.</p> <p>17 If another meta-analysis comes out tomorrow,</p> <p>18 then I would review it.</p> <p>19 Q. Do you know the source of funding for</p> <p>20 this publication?</p> <p>21 A. I don't know. I mean, Health Canada or</p> <p>22 something else, I don't know that. I can't</p> <p>23 answer that question.</p> <p>24 Q. You're assuming that Health Canada is</p> <p>25 the source of funding for this publication?</p>
<p style="text-align: right;">Page 111</p> <p>1 Taher publication, Exhibit 17?</p> <p>2 A. So I don't -- yeah, again, I take it --</p> <p>3 I don't know the status of that manuscript, where</p> <p>4 it is.</p> <p>5 Q. You do not know, one way or the other,</p> <p>6 as to whether the Taher publication, Exhibit 17,</p> <p>7 has been peer-reviewed; is that right?</p> <p>8 A. Yeah. Whether it's been accepted or</p> <p>9 submitted or -- I don't know.</p> <p>10 Q. Are you finished?</p> <p>11 A. I don't know the status. I'm trying to</p> <p>12 say that.</p> <p>13 Q. In your epidemiological work, outside</p> <p>14 of litigation, do you rely on articles that have</p> <p>15 not been peer-reviewed?</p> <p>16 A. Yes. Several times, we rely on</p> <p>17 articles. Several times, we actually request</p> <p>18 articles if it's key to something that we are</p> <p>19 working on and we know that a particular</p> <p>20 investigator is active in that area and he may</p> <p>21 have.</p> <p>22 So, yes, we actually -- sometimes we request</p> <p>23 that. And the majority of the times people don't</p> <p>24 provide their work until it's published. But</p> <p>25 sometimes we get it. Yeah.</p>	<p style="text-align: right;">Page 113</p> <p>1 A. I don't know. I shouldn't answer that.</p> <p>2 Q. Do you know the credentials of the</p> <p>3 authors of the Taher 2018 publication,</p> <p>4 Exhibit 17?</p> <p>5 A. I have no idea.</p> <p>6 Q. Do you personally know any of the</p> <p>7 authors that are listed?</p> <p>8 A. No.</p> <p>9 Q. Do you know whether or not any of the</p> <p>10 authors of the Taher publication, as listed out</p> <p>11 on the first page of Exhibit 17, have conflicts</p> <p>12 of interest?</p> <p>13 MS. PARFITT: Objection.</p> <p>14 A. Not that -- I didn't -- again, I read</p> <p>15 the article. I don't know what their, you know,</p> <p>16 declarations are. Yeah.</p> <p>17 And it does say it was conducted under</p> <p>18 contract to Health Canada. So it seems like the</p> <p>19 funding source is Health Canada. And let's look</p> <p>20 at their source of funding.</p> <p>21 Q. Doctor, we'll never finish if you want</p> <p>22 to just go through and look at things.</p> <p>23 My specific question is whether or not you</p> <p>24 know whether or not any of the authors have</p> <p>25 conflicts of interest?</p>

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<p style="text-align: right;">Page 114</p> <p>1 MS. PARFITT: Objection. 2 A. That's a very vague and broad question. 3 I mean, conflicts of interest as it relates to 4 what? 5 Q. Do you know? 6 MS. PARFITT: Objection. Form. 7 A. As it relates to what? 8 Q. You told me you don't know any of the 9 authors; right? 10 A. Yeah. 11 Q. I've now asked you if you know if any 12 of the authors had conflicts of interest. 13 A. And I'm saying that I'm reading the 14 article and I'm reading their declaration, and 15 that's the only way to find out that they have 16 conflicts of interest, right. 17 Q. I should be more precise. 18 A. Yeah. 19 Q. Of your own personal knowledge, do you 20 know whether or not any of the authors have 21 conflicts of interest? 22 A. That's a separate -- 23 MS. PARFITT: Objection. 24 A. So what I'm trying to say is, you know, 25 when you ask about conflicts of interest, if you</p>	<p style="text-align: right;">Page 116</p> <p>1 sentence. And I'll read it. Have you found 2 Page 41 of Exhibit 17? 3 A. 41? 4 Q. Yes. Page 41. Do you have that? 5 A. Yeah. Yeah. 6 Q. The very last -- 7 A. Yeah. I'm looking at it. 8 Q. Tell me if I read this correctly. "The 9 similarity of findings between studies published 10 prior to and after this point suggest asbestos 11 contamination does not explain the positive 12 association between perineal use of talc powder 13 and risk of ovarian cancer." 14 Did I read that correctly? 15 A. Yes. 16 Q. Do you disagree with the authors on 17 that point? 18 A. Let me just read it. 19 Well, I mean, to the extent that they are 20 aware that asbestos does not contaminate -- talc 21 is not contaminated with asbestos, I do agree. 22 But, again, I have, you know, obviously more 23 information on that. 24 Q. On Page 25 of Exhibit 17, the Taher 25 2018 article, is a table entitled "Summary of</p>
<p style="text-align: right;">Page 115</p> <p>1 want to ask about my article, you'd have to go 2 and read the article and see that, what is stated 3 there. 4 So that's what I'm trying to answer when you 5 ask. I'm trying to be honest and truthful about 6 my answers. 7 MR. KLATT: Objection; nonresponsive. 8 MR. ZELLERS: Move to strike as 9 nonresponsive. 10 THE WITNESS: I didn't understand the 11 question. 12 MR. LOCKE: We all have questions to 13 ask this witness. We're not going to make the 14 seven hours with these answers that do not answer 15 the questions. 16 THE WITNESS: Maybe I'm not 17 understanding the question. I'm sorry. It's not 18 that I'm trying to -- 19 Q. Dr. Singh, the authors of the Taher 20 paper concluded that the evidence suggests that 21 asbestos contamination does not explain the 22 positive association between perineal use of talc 23 powder and ovarian cancer; is that right? 24 A. Where do you -- 25 Q. Take a look at Page 41, the last</p>	<p style="text-align: right;">Page 117</p> <p>1 Evidence for Each of the Hill Criteria of 2 Causation as Applied to Perineal Application of 3 Talc and Ovarian Cancer." 4 Is that right? 5 A. Yes. 6 Q. One of the Hill criteria is 7 consistency; is that right? 8 MS. PARFITT: Objection. Form. 9 A. Yes. 10 Q. Looking at authors' statement on 11 consistency, it states, "15 out of the 30 studies 12 reported positive and significant associations." 13 Is that right? 14 A. Yes. 15 Q. 15 out of 30, that's 50 percent; is 16 that right? 17 MS. PARFITT: Objection. Form. 18 A. Yeah. But I have -- I disagree with 19 their interpretation of consistency as being, you 20 know, statistically significant. I mean, you 21 know, my assessment is, you know, estimates 22 towards greater than one. 23 MR. ZELLERS: Move to strike as 24 nonresponsive. 25 Q. My question was: 15 out of 30 is</p>

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<p style="text-align: right;">Page 118</p> <p>1 50 percent?</p> <p>2 A. Yes.</p> <p>3 MS. PARFITT: Objection. Let me</p> <p>4 object, please.</p> <p>5 Q. That's no better than a coin toss;</p> <p>6 correct?</p> <p>7 MS. PARFITT: Object to the form.</p> <p>8 A. It is 50 percent.</p> <p>9 Q. Would you say that 15 out of 30 means</p> <p>10 there are consistent results across studies?</p> <p>11 A. Well, I mean, again, my definition of</p> <p>12 inconsistency, as noted in my report, is</p> <p>13 different from theirs.</p> <p>14 Q. These are just the case control</p> <p>15 studies; is that right?</p> <p>16 A. When you say -- they just say 30</p> <p>17 studies. Yeah.</p> <p>18 Q. These are case-control studies; is that</p> <p>19 right?</p> <p>20 MS. PARFITT: Objection. Form.</p> <p>21 A. Well, they're both, right? Case</p> <p>22 control and core.</p> <p>23 Q. The authors in Taher also recognize</p> <p>24 that there's no consistent dose-response across</p> <p>25 studies; is that right?</p>	<p style="text-align: right;">Page 120</p> <p>1 consistent evidence. There are studies that</p> <p>2 provide dose-response and other studies that</p> <p>3 don't.</p> <p>4 Q. You currently work for the University</p> <p>5 of Massachusetts; is that right?</p> <p>6 A. Yes.</p> <p>7 Q. You work for both the medical school</p> <p>8 and the medical center; is that right?</p> <p>9 A. Yes.</p> <p>10 Q. Are you aware that the University of</p> <p>11 Massachusetts does not claim that talcum powder</p> <p>12 causes ovarian cancer?</p> <p>13 MS. PARFITT: Objection. Form.</p> <p>14 A. I don't know what -- they're listed on</p> <p>15 their website. I'm not sure they provide any</p> <p>16 information sheet that I am aware of.</p> <p>17 (Printout entitled "Ovarian</p> <p>18 Cancer: Risk Factors" marked Exhibit 18.)</p> <p>19 BY MR. ZELLERS:</p> <p>20 Q. Take a look, if you will, at Deposition</p> <p>21 Exhibit 18.</p> <p>22 MR. TISI: What is 16?</p> <p>23 MR. ZELLERS: Exhibit 16 was the Health</p> <p>24 Canada Decision-Making Framework. It's right</p> <p>25 here.</p>
<p style="text-align: right;">Page 119</p> <p>1 MS. PARFITT: Objection. Form.</p> <p>2 A. Well, let me look at the dose-response</p> <p>3 section.</p> <p>4 Q. Page 21. And I'm looking at the very</p> <p>5 last sentence above Section 3.3.2.</p> <p>6 A. Tell me, which page number?</p> <p>7 Q. Sure. Page 21.</p> <p>8 A. We do have to slow down so that I can</p> <p>9 move between pages, if you don't mind.</p> <p>10 Yes.</p> <p>11 Q. This is in the section "Evidence from</p> <p>12 Human Studies"; correct?</p> <p>13 A. Okay.</p> <p>14 Q. Is that a yes?</p> <p>15 A. Yes.</p> <p>16 Q. The statement by the authors, "When</p> <p>17 conducted, findings from trend analyses were not</p> <p>18 consistent."</p> <p>19 Is that right?</p> <p>20 A. The last line?</p> <p>21 Q. Yes.</p> <p>22 A. Yes. But the criteria for</p> <p>23 dose-response is just exposure-response</p> <p>24 gradients. I mean, it doesn't, you know, say</p> <p>25 as -- even in -- I state in my report, there's no</p>	<p style="text-align: right;">Page 121</p> <p>1 MR. TISI: Oh. I have that, Counsel.</p> <p>2 Thank you.</p> <p>3 BY MR. ZELLERS:</p> <p>4 Q. Have you had an opportunity, Dr. Singh,</p> <p>5 to review Deposition Exhibit 18?</p> <p>6 A. Yes.</p> <p>7 Q. This is a website from the University</p> <p>8 of Massachusetts Memorial Healthcare; is that</p> <p>9 right?</p> <p>10 A. Yes.</p> <p>11 Q. Are you familiar with the website?</p> <p>12 A. I mean, overall website, but not this</p> <p>13 particular document.</p> <p>14 Q. On the second page of Exhibit 18,</p> <p>15 there's a statement by your employer, the</p> <p>16 University of Massachusetts, on use of talcum</p> <p>17 powder.</p> <p>18 Do you see that?</p> <p>19 A. Yes.</p> <p>20 Q. The statement is, "It's not clear if</p> <p>21 using talcum powder on the genital area raises</p> <p>22 the risk for ovarian cancer. Talk with your</p> <p>23 healthcare provider if you decide you want to use</p> <p>24 talcum powder."</p> <p>25 Did I read that correctly?</p>

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<p style="text-align: right;">Page 122</p> <p>1 A. Yes, you did.</p> <p>2 Q. Why doesn't your institution list talc</p> <p>3 exposure as a risk factor for ovarian cancer?</p> <p>4 MS. PARFITT: Objection. Misstates the</p> <p>5 evidence.</p> <p>6 A. So, yeah, I mean, first of all, this</p> <p>7 is -- I've seen this the first time here, but as</p> <p>8 you can see, again, this is -- we have to go to</p> <p>9 Page 3 of 4 and it's medical reviewers and they</p> <p>10 are, you know, basing their opinion on whatever.</p> <p>11 This was done in 2013.</p> <p>12 So it depends on the -- it's not that, you</p> <p>13 know, my medical, you know, employer is listing</p> <p>14 it. Obviously, it's listed there.</p> <p>15 And but it's based on the quality of the</p> <p>16 evidence. This was reviewed on 2016, and it was</p> <p>17 reviewed by, as you see, the credentials of --</p> <p>18 did they review the -- did they review the</p> <p>19 biological evidence? Did they have any</p> <p>20 additional information?</p> <p>21 So I don't disagree with their opinion, I'm</p> <p>22 just saying.</p> <p>23 Q. Dr. Singh, do you recommend to your own</p> <p>24 patients that they avoid talcum powder use?</p> <p>25 A. Now, I do.</p>	<p style="text-align: right;">Page 124</p> <p>1 take a look at Exhibit 2 or Exhibit 10, whichever</p> <p>2 is easier for you.</p> <p>3 A. Page 66?</p> <p>4 Q. Yes. Your conclusion.</p> <p>5 A. Yes.</p> <p>6 Q. You state that peritoneal use of talcum</p> <p>7 powder products can cause ovarian cancer;</p> <p>8 correct?</p> <p>9 A. Yes.</p> <p>10 Q. Is it your opinion that it does cause</p> <p>11 ovarian cancer or just that it can?</p> <p>12 MS. PARFITT: Objection to form.</p> <p>13 A. I don't know the semantics of what</p> <p>14 would be -- if -- semantics of can and does. I</p> <p>15 mean, you can explain to me. Maybe my English is</p> <p>16 not as good as yours.</p> <p>17 Q. What type of exposure causes ovarian</p> <p>18 cancer?</p> <p>19 A. Perineal application. So I mean, are</p> <p>20 you asking specific to talc?</p> <p>21 Q. Yes. With respect to talc exposure,</p> <p>22 what type of talc exposure causes ovarian cancer?</p> <p>23 MS. PARFITT: Objection. Form.</p> <p>24 A. You know, perineal application of talc</p> <p>25 can, you know, use of talc.</p>
<p style="text-align: right;">Page 123</p> <p>1 Q. When did you begin doing that?</p> <p>2 A. Last year.</p> <p>3 Q. Do you ask them if they use talcum</p> <p>4 powder as part of a routine screening?</p> <p>5 A. In people that -- sorry.</p> <p>6 In patients that I talk about ovarian</p> <p>7 cancer.</p> <p>8 Q. Is that something that you began doing</p> <p>9 over the past year?</p> <p>10 A. I would say sometime last year.</p> <p>11 Q. What about patients with a long history</p> <p>12 of use? Do you consider them at elevated risk of</p> <p>13 developing cancer?</p> <p>14 MS. PARFITT: Objection. Form.</p> <p>15 A. So I haven't thought about it that way.</p> <p>16 I mean, you know, when that discussion about</p> <p>17 ovarian cancer comes up, we talk about risk</p> <p>18 factors and, you know, I recommended that.</p> <p>19 Q. Have you ever recommended prophylactic</p> <p>20 surgery to remove the fallopian tubes and ovaries</p> <p>21 that you think -- patients that you think may</p> <p>22 have had long-term exposure to talc?</p> <p>23 MS. PARFITT: Objection. Form.</p> <p>24 A. No.</p> <p>25 Q. Causation. On Page 66 of your report,</p>	<p style="text-align: right;">Page 125</p> <p>1 Q. What types of -- strike that.</p> <p>2 What types of talcum powder cause ovarian</p> <p>3 cancer?</p> <p>4 MS. PARFITT: Objection. Form.</p> <p>5 A. So, again, I -- I -- my causal question</p> <p>6 was the use of talcum powder products and ovarian</p> <p>7 cancer. I did not disaggregate between X and Y</p> <p>8 and Z in terms of, you know, this type of talcum</p> <p>9 powder product.</p> <p>10 Q. What type of ovarian cancer does talcum</p> <p>11 powder cause?</p> <p>12 MS. PARFITT: Objection. Form.</p> <p>13 A. Talcum powder products are, you know,</p> <p>14 causally linked to the development of ovarian</p> <p>15 cancer, but the link is strongest for serous</p> <p>16 epithelial ovarian cancer.</p> <p>17 Q. Any other types of ovarian cancer that</p> <p>18 you believe talcum powder causes?</p> <p>19 MS. PARFITT: Objection. Form.</p> <p>20 A. You know, other studies have provided,</p> <p>21 you know, causal links to borderline, you know,</p> <p>22 other tumors. But, you know, it's mainly the</p> <p>23 epithelial ovarian cancer.</p> <p>24 Q. What dose of talcum powder is required</p> <p>25 to cause ovarian cancer?</p>

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<p>1 MS. PARFITT: Objection. Form.</p> <p>2 A. I examined, you know, the causal link</p> <p>3 between talcum powder products and ovarian cancer</p> <p>4 as the data was available in the available</p> <p>5 studies. You know, I could not -- there was</p> <p>6 no -- I mean, there was data on</p> <p>7 dose-responsiveness, and we can discuss that.</p> <p>8 But, you know, I don't know if it's a single</p> <p>9 application or it's 20 years. I mean, it is</p> <p>10 regular use and that would cause it.</p> <p>11 Q. It's correct that you have not</p> <p>12 evaluated specifically what dose of talcum powder</p> <p>13 is required to cause ovarian cancer; correct?</p> <p>14 MS. PARFITT: Object to form.</p> <p>15 A. Yeah. I mean, I don't know a specific</p> <p>16 dose that would cause ovarian cancer.</p> <p>17 Q. What was your methodology for</p> <p>18 concluding that talc causes ovarian cancer or, I</p> <p>19 guess to be more precision, serous ovarian</p> <p>20 cancer?</p> <p>21 A. Yeah. I mean, mainly --</p> <p>22 MS. PARFITT: Objection.</p> <p>23 A. Yeah. Epithelial ovarian cancer.</p> <p>24 Q. What was your methodology?</p> <p>25 A. So, yeah, I did, you know -- so prior</p>	<p>1 Q. You did not conduct a meta-analysis</p> <p>2 here; is that right?</p> <p>3 A. Yes. And I -- partly pragmatic</p> <p>4 reasons. Partly, there were so many other</p> <p>5 meta-analyses that I, you know -- although I</p> <p>6 would have done things a little bit differently,</p> <p>7 and I just didn't feel the need for one more</p> <p>8 meta-analysis that would be informative.</p> <p>9 Q. What was your methodology for focusing</p> <p>10 on certain studies or excluding other studies?</p> <p>11 A. So I'm not aware that I excluded</p> <p>12 certain studies, because I, as I compare, I have</p> <p>13 included all the epidemiologic studies that are</p> <p>14 here. There's always a possibility that once,</p> <p>15 you know, when you do a review, that you may</p> <p>16 have.</p> <p>17 But, you know, I included all the relevant</p> <p>18 case-control studies and the cohort studies and</p> <p>19 the systematic review and meta-analysis that I</p> <p>20 identified.</p> <p>21 And, yeah, I mean, I may have weighed</p> <p>22 studies differently based on their quality,</p> <p>23 validity and reliability.</p> <p>24 Q. That's how you tried to make a</p> <p>25 distinction?</p>
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<p>1 to that, I was aware of systematic reviews and</p> <p>2 other reviews in this area.</p> <p>3 So I, as a broad -- you know, we should look</p> <p>4 at the methods section of this report.</p> <p>5 Do you want to look at the methods?</p> <p>6 Q. Well, if you have to. I mean, my</p> <p>7 question was just simply: What was your</p> <p>8 methodology for concluding that talc causes</p> <p>9 epithelial ovarian cancer?</p> <p>10 MS. PARFITT: Dr. Singh, anytime you</p> <p>11 need to consult your report.</p> <p>12 A. Yeah. I mean, the methodology was, you</p> <p>13 know, gathering lines of evidence. You know,</p> <p>14 assessing for relevance, reliability and, you</p> <p>15 know, again, assembling other lines of evidence</p> <p>16 for animal, human studies, the constituents of</p> <p>17 talc. And then assessing them within an analytic</p> <p>18 framework, the Bradford Hill, and then, you know,</p> <p>19 providing a weight-of-evidence opinion based on</p> <p>20 my professional judgment.</p> <p>21 Q. In other cases in which you've been</p> <p>22 retained as an expert, you've conducted a</p> <p>23 meta-analysis of the available data to reach a</p> <p>24 conclusion about the relative risk; correct?</p> <p>25 A. I have.</p>	<p>1 A. Yeah.</p> <p>2 Q. Do you believe the standard for proving</p> <p>3 causation in the scientific literature is the</p> <p>4 same as the one that applies in litigation?</p> <p>5 MS. PARFITT: Objection. Form.</p> <p>6 A. Yeah. I mean, the standard for</p> <p>7 causation, you know, is -- at least I was</p> <p>8 applying the same standard.</p> <p>9 Q. Are you familiar with the FDA analysis</p> <p>10 of the Bradford Hill factors and that they have</p> <p>11 concluded that causation is not established with</p> <p>12 respect to talc and ovarian cancer?</p> <p>13 MS. PARFITT: Objection. Misstates the</p> <p>14 evidence.</p> <p>15 A. I am aware of a FDA letter. I'm not</p> <p>16 sure that there's a Bradford Hill analysis. And</p> <p>17 if you can share that with me, that would be --</p> <p>18 Q. Please review Deposition Exhibit 19.</p> <p>19 (Letter dated April 1, 2014</p> <p>20 marked Exhibit 19.)</p> <p>21 MS. PARFITT: Thank you.</p> <p>22 BY MR. ZELLERS:</p> <p>23 Q. Deposition Exhibit 19 is a letter from</p> <p>24 the FDA to Sam Epstein, dated April 1st of 2014;</p> <p>25 is that right?</p>

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<p>1 A. Yes.</p> <p>2 Q. And when I say "dated," there's a stamp</p> <p>3 at the top that says April 1, 2014; correct?</p> <p>4 A. Yes.</p> <p>5 Q. Have you reviewed this FDA analysis</p> <p>6 before today?</p> <p>7 A. Yes. I have reviewed the letter.</p> <p>8 Yeah.</p> <p>9 Q. On Page 4 of the FDA document, at the</p> <p>10 bottom, do you see that?</p> <p>11 A. I do.</p> <p>12 Q. The FDA noted that selection bias</p> <p>13 and/or uncontrolled confounding result in</p> <p>14 spurious positive associations between talc use</p> <p>15 and ovarian cancer; is that right?</p> <p>16 MS. PARFITT: Objection. Form.</p> <p>17 A. Yes. That's what they conclude.</p> <p>18 Q. The FDA notes a lack of consistency in</p> <p>19 the study results; is that right?</p> <p>20 MS. PARFITT: Objection.</p> <p>21 A. Yes. And this was conducted in, I</p> <p>22 don't know, 2014, 2013.</p> <p>23 Q. The FDA specifically states, "Results</p> <p>24 of case-control studies do not demonstrate a</p> <p>25 consistent positive association across studies";</p>	<p>1 MS. PARFITT: Objection. Form.</p> <p>2 A. So just to clarify, where do they say</p> <p>3 they apply the Bradford Hill in this document?</p> <p>4 Q. You're familiar with the Bradford Hill</p> <p>5 criteria; is that right?</p> <p>6 A. Yes. I use it, but in this FDA</p> <p>7 document, where does it state they apply the --</p> <p>8 Q. It is one of the criteria for</p> <p>9 consistency across studies. Is that a Bradford</p> <p>10 Hill criteria?</p> <p>11 A. But exactly they don't go through all</p> <p>12 of them. So I don't know if they did a Bradford</p> <p>13 Hill. So how can I just assume that? They don't</p> <p>14 talk about, you know, specificity. They don't</p> <p>15 talk about strength of association. So I can't</p> <p>16 assume that they're applying Bradford Hill.</p> <p>17 Q. IARC did address the Bradford Hill</p> <p>18 considerations; is that right?</p> <p>19 A. Yes. In the year 2005. That was</p> <p>20 around 15 years ago.</p> <p>21 Q. IARC rejected classification of talc as</p> <p>22 carcinogenic and, instead, assigned it to the</p> <p>23 classification of possibly carcinogenic to</p> <p>24 humans; is that right?</p> <p>25 MS. PARFITT: Objection. Misstates the</p>
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<p>1 is that right?</p> <p>2 A. Yes. That's what they state.</p> <p>3 Q. The FDA also states that,</p> <p>4 "Dose-response evidence is lacking"; is that</p> <p>5 right?</p> <p>6 MS. PARFITT: Objection.</p> <p>7 A. Where is that? I'm sorry.</p> <p>8 Q. Look at Paragraph 3 at the bottom of</p> <p>9 Page 4.</p> <p>10 A. Yes.</p> <p>11 Q. The FDA further concludes that, "A</p> <p>12 cogent biological mechanism by which talc might</p> <p>13 lead to ovarian cancer is lacking"; is that</p> <p>14 right?</p> <p>15 MS. PARFITT: Objection to form.</p> <p>16 A. Yeah. But it also concludes, in the</p> <p>17 same letter, that there is, you know, the</p> <p>18 potential for talc to migrate. So, I mean, I'm</p> <p>19 just trying to be -- that's what I reviewed.</p> <p>20 Yes, it does say that there's no biological</p> <p>21 mechanism.</p> <p>22 Q. You reviewed -- or strike that.</p> <p>23 In addition to the FDA looking at and</p> <p>24 applying the Bradford Hill criteria, IARC does</p> <p>25 that as well; is that right?</p>	<p>1 evidence.</p> <p>2 A. So, again, you know, just clarifying</p> <p>3 that this was done in 2005, with evidence that</p> <p>4 has accumulated since then. And I wouldn't</p> <p>5 classify it -- I have served on IARC panels, and</p> <p>6 I'm very familiar with their process. They don't</p> <p>7 reject anything. They classify drugs in the</p> <p>8 particular categories that they're supposed to</p> <p>9 be.</p> <p>10 So it was actually classified as possibly</p> <p>11 carcinogenic.</p> <p>12 Q. Take a look at Exhibit 20.</p> <p>13 (IARC Classifications marked</p> <p>14 Exhibit 20.)</p> <p>15 BY MR. ZELLERS:</p> <p>16 Q. Deposition Exhibit 20 are the IARC</p> <p>17 classifications; is that right?</p> <p>18 I'm sorry. Did you answer the question?</p> <p>19 A. Yes. Sorry.</p> <p>20 Q. That's okay.</p> <p>21 A. Yes.</p> <p>22 Q. All right. It lists out, starting with</p> <p>23 Group 1, carcinogenic to humans, down to Group 4;</p> <p>24 is that right?</p> <p>25 A. Yes.</p>

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<p>1 Q. There are 120 agents that have been 2 determined by IARC, the International Agency for 3 Research on Cancer, as Group 1 agents, 4 carcinogenic to humans; is that right? 5 A. Yeah. That includes asbestos, many 6 others. 7 Q. That is the only category in which IARC 8 finds sufficient evidence in humans; correct? 9 A. No. To clarify, they have -- it may be 10 in my report, that they have a particular way of 11 defining that category. And it may not be just 12 sufficient evidence in humans. They may be 13 something else. If I can look back at my report. 14 Q. Well, if it's in your report, it's in 15 your report. And we can all read that. 16 My question to you is: Group 1 is a 17 category where IARC has determined that there is 18 sufficient evidence in humans to classify an 19 agent as carcinogenic; is that right? 20 MS. PARFITT: Objection. Misstates 21 Dr. Singh's testimony. 22 A. I mean, do I get time to -- 23 Q. Doctor, I only have seven hours here. 24 So go to Exhibit 20. I'll make this quick. 25 Do you see Exhibit 20 in front of you?</p>	<p>1 A. Yes. 2 Q. So out of the 1,000 agents that IARC 3 has reviewed, it has placed only one agent in 4 Group 4, probably not carcinogenic; is that 5 right? 6 A. Yeah. But 499 are not classifiable as 7 it relates, so. 8 Q. IARC doesn't even have a Group 5, not 9 carcinogenic, does it? 10 A. Well, I mean, all the -- once it's 11 probably not carcinogenic, it's not carcinogenic. 12 Q. The best that IARC can state is that an 13 agent is probably not carcinogenic to humans, 14 which is Group 4; is that right? 15 A. Yes. 16 MS. PARFITT: Objection. 17 Q. All right. As with -- strike that. 18 With genital talc, the IARC group 2B 19 designation is based on limited evidence in 20 humans; is that right? 21 MS. PARFITT: Objection. 22 A. Yes. There was some animal 23 consideration. There were some biological 24 mechanisms, but, again, in 2005, and as I state 25 in my report, which I have, and there have been</p>
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<p>1 A. Yeah. 2 Q. This is the IARC classifications; is 3 that right? 4 A. Okay. Mm-hmm. 5 Q. Group 1 states, "Carcinogenic to 6 humans." 7 A. Yes. 8 Q. Do you see that? 9 A. Yeah. 10 Q. All right. Group 2A, there are 82 11 agents that are probably carcinogenic to humans; 12 is that right? 13 A. Yes. 14 Q. IARC is certainly capable of reaching a 15 decision that something is a known or probable 16 carcinogen; is that right? 17 MS. PARFITT: Objection. 18 A. Yes. I mean, 15 years ago, yes, based 19 on the evidence. 20 Q. It has placed at least 200 agents in 21 Group 1 or Group 2A; is that right? 22 A. Yes. 23 Q. There's only one agent in Group 4, 24 probably not carcinogenic to humans; is that 25 right?</p>	<p>1 multiple studies since then. And that, you know, 2 that they should be revisited. 3 Q. That means IARC cannot rule out chance, 4 bias or confounding with reasonable confidence; 5 correct? 6 A. Based on the data they had at that 7 time. 8 Q. What else is in 2B, possibly -- strike 9 that. 10 What else is in class 2B, possibly 11 carcinogenic? Are you familiar with Ginkgo 12 biloba? 13 MS. PARFITT: Objection to form. 14 A. I know the name. 15 Q. Are you aware that that's classified as 16 a 2B agent by IARC? 17 A. I don't know. I mean, you know, they 18 also classify as it relates to exposure. So I 19 haven't reviewed Ginkgo biloba to be able to 20 answer the question. 21 Q. Pickled vegetables, 2B; is that right? 22 A. How do I know? Show me. 23 Q. Occupational -- 24 A. That's what you're saying. 25 Q. -- carpentry and joinery, 2B? Are you</p>

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<p style="text-align: right;">Page 138</p> <p>1 aware of that?</p> <p>2 A. Again, this is 2015. And, you know,</p> <p>3 yes. I don't know I'm aware of that. I mean,</p> <p>4 you can't put words in my mouth that pickle --</p> <p>5 how do I know that?</p> <p>6 Q. There's no chance of my putting words</p> <p>7 in your mouth. IARC can change its</p> <p>8 classification for a substance; is that right?</p> <p>9 A. It does. I mean, from what I</p> <p>10 understand.</p> <p>11 Q. It has not changed its Group 2B</p> <p>12 classification since it determined that talc was</p> <p>13 a 2B agent; is that right?</p> <p>14 MS. PARFITT: Objection. Form.</p> <p>15 A. It has not carried out an assessment</p> <p>16 since 2005, that I'm aware of.</p> <p>17 Q. Has IARC changed its group 2B</p> <p>18 classification?</p> <p>19 A. No --</p> <p>20 MS. PARFITT: Objection.</p> <p>21 A. -- and as far as I'm aware, no</p> <p>22 assessment has been carried out.</p> <p>23 Q. Bradford Hill, strength of association</p> <p>24 is one of the criteria; is that right?</p> <p>25 A. I don't consider them criteria.</p>	<p style="text-align: right;">Page 140</p> <p>1 Q. Doctor, I'm asking you questions.</p> <p>2 My question is: Epidemiologists consider a</p> <p>3 1.3 odds ratio in case-control studies to be a</p> <p>4 weak or modest association; correct?</p> <p>5 MS. PARFITT: Objection. Misstates the</p> <p>6 evidence and the science.</p> <p>7 A. Not the epidemiologists that I</p> <p>8 contacted. You know, we look at various, you</p> <p>9 know -- as I state in my report, you know, you</p> <p>10 can have modest associations and you can have a</p> <p>11 relative risk of one that are lower, and if you</p> <p>12 go to a low-prevalence population, and then</p> <p>13 remove competing risk factors, those can be</p> <p>14 attenuated.</p> <p>15 So the epidemiologists that I interact with,</p> <p>16 and we don't look at this as weak or modest or</p> <p>17 high. We just look at it in the whole causal</p> <p>18 framework.</p> <p>19 Q. Can you point to any peer-reviewed</p> <p>20 literature on talc and ovarian cancer that states</p> <p>21 that 1.3 odds ratio is a strong association?</p> <p>22 A. Again, that's not -- I'm not looking at</p> <p>23 talc at 1.3 is a strong association. I'm stating</p> <p>24 that, yeah, I can't point to the talc literature</p> <p>25 that states that.</p>
<p style="text-align: right;">Page 139</p> <p>1 There's overviews. I think -- I'm just picking</p> <p>2 the terms. I mean, they're overviews of Bradford</p> <p>3 Hill. Doesn't list them as criteria, because</p> <p>4 criteria implies a list of things that you can</p> <p>5 pick and choose from.</p> <p>6 Q. You would call them what?</p> <p>7 A. Overviews. Actually, that's what he</p> <p>8 calls them.</p> <p>9 Q. Overviews. Strength of association is</p> <p>10 a Bradford Hill overview; is that right?</p> <p>11 A. Yes.</p> <p>12 Q. Epidemiologists consider a 1.3 odds</p> <p>13 ratio in case-control studies to be a weak or</p> <p>14 modest association; is that right?</p> <p>15 MS. PARFITT: Objection. Misstates the</p> <p>16 evidence.</p> <p>17 A. No. I mean, again, strength of</p> <p>18 association based on -- depends on the study</p> <p>19 question at hand, the study design, and, you</p> <p>20 know, the quality of the underlying data. So</p> <p>21 strength of association, in and of itself, does</p> <p>22 not provide any -- any -- any sort of -- any</p> <p>23 answer to the causal question. Again, I'll go</p> <p>24 back to my report, because I have to go back to</p> <p>25 my report.</p>	<p style="text-align: right;">Page 141</p> <p>1 Q. IARC does not refer to this as a strong</p> <p>2 association; correct?</p> <p>3 MS. PARFITT: Objection. Form.</p> <p>4 A. I don't know what -- the particular</p> <p>5 objective or qualifier they use. I mean --</p> <p>6 Q. FDA doesn't refer to this as a strong</p> <p>7 association, do they?</p> <p>8 MS. PARFITT: Objection to form.</p> <p>9 A. Again, you have to sort of just show me</p> <p>10 where they are, and I'll agree with it.</p> <p>11 Q. Have you seen any statement from IARC</p> <p>12 that there is a strong association between</p> <p>13 genital talc use and ovarian cancer?</p> <p>14 A. I don't recall that particular phrase.</p> <p>15 Q. All right. The National Cancer</p> <p>16 Institute doesn't refer to this as a strong</p> <p>17 association; correct?</p> <p>18 MS. PARFITT: Objection to form.</p> <p>19 A. I don't recall that particular</p> <p>20 objective.</p> <p>21 Q. Do your opinions on strength of</p> <p>22 association apply equally to all forms of ovarian</p> <p>23 cancer?</p> <p>24 MS. PARFITT: Objection. Form.</p> <p>25 A. Again, I'm -- you know, my opinions are</p>

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<p style="text-align: right;">Page 142</p> <p>1 not -- again, we can parse this out. I mean, I 2 was just looking at the causal question. Is talc 3 causally related to the development of ovarian 4 cancer? 5 And, you know, most of the evidence that I 6 examined were -- was provided in terms of serous 7 epithelial cancer, and -- 8 Q. I thought you told me that your 9 methodology was to look at the Bradford Hill 10 overview factors; is that right? 11 A. Yeah. 12 Q. All right. And one of those factors is 13 strength of association; is that right? 14 A. Yes. 15 Q. And that's a factor that you looked at; 16 correct? 17 A. Yes. 18 Q. Do your opinions on strength of 19 association apply equally to all forms of ovarian 20 cancer? 21 MS. PARFITT: Objection. Form. 22 A. Well, I did not disaggregate my, you 23 know, opinion by histologic subtype. 24 Q. You cite to the Langseth paper; is that 25 right?</p>	<p style="text-align: right;">Page 144</p> <p>1 me when you have that. 2 A. Yeah. 3 Q. "Proposal to research community." Do 4 you see that? 5 A. Yes. 6 Q. Tell me if I read this statement by the 7 authors correctly. 8 "The current body of experimental and 9 epidemiological evidence is insufficient to 10 establish a causal association between perineal 11 use of talc and ovarian cancer risk. 12 Experimental research is needed to better 13 characterize deposition, retention, and clearance 14 of talc to evaluate the ovarian carcinogenicity 15 of talc." 16 Did I read that correctly? 17 A. Yes. 18 Q. You're drawing conclusions from this 19 study that are broader than the study authors' 20 own conclusions; is that right? 21 MS. PARFITT: Objection. 22 A. I didn't draw. So you were asking me 23 that whether I drew a single conclusion from the 24 Langseth. I mean, there are -- I think I cite 25 all the meta-analyses first, and then -- so I'm</p>
<p style="text-align: right;">Page 143</p> <p>1 A. I do. 2 Q. You state that the authors in Langseth 3 2008 found an odds ratio ranging between 1.12 to 4 1.4, depending upon the type of study design. Is 5 that right? This is on Page 22 of your report. 6 A. Okay. 7 Q. Langseth, in fact, rejects causation 8 and says more study is needed; correct? 9 MS. PARFITT: Objection. Form. 10 A. I don't know why you have stated they 11 reject causation. Show me that statement in that 12 article. 13 Q. Take a look, if you will, at Deposition 14 Exhibit 21. 15 (Article entitled "Perineal use 16 of talc and risk of ovarian cancer" marked 17 Exhibit 21.) 18 MS. PARFITT: Thank you. 19 MR. ZELLERS: Mm-hmm. 20 BY MR. ZELLERS: 21 Q. Deposition Exhibit 21 is the Langseth 22 2008 meta-analysis that you cite in your report; 23 is that right? 24 A. Yeah. It's one of the meta-analyses. 25 Q. Turn to Page 359 of Exhibit 21. Tell</p>	<p style="text-align: right;">Page 145</p> <p>1 not just drawing inferences from there. 2 And the authors, as far as I am aware, A, 3 there have been several other studies published 4 since then. This is 2007. So we have 12 years 5 and several publications. And, B, the authors 6 themselves have provided opinions that they are 7 causally related. Dr. Siemiatycki, as far as I'm 8 aware. 9 Q. Did you cite this paper in your report? 10 A. Yes. 11 Q. The authors in this paper state that 12 the current body of experimental and 13 epidemiological evidence is insufficient to 14 establish a causal association between perineal 15 use of talc and ovarian cancer risk; is that 16 right? 17 MS. PARFITT: Objection. Misstates the 18 evidence in this case. The science and 19 testimony. 20 A. It says the current body of evidence. 21 This is current as of two thousand and whenever. 22 Q. This is the paper. 2008, Exhibit 21, 23 that you relied on -- 24 A. Yeah. 25 Q. -- and cite in your report; correct?</p>

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<p style="text-align: right;">Page 146</p> <p>1 A. This is not the only --</p> <p>2 MS. PARFITT: Objection. Form.</p> <p>3 A. -- paper. I cited on 2017, 2018.</p> <p>4 Q. Go to the acknowledgments section.</p> <p>5 Do you see the acknowledgments off to the</p> <p>6 left?</p> <p>7 A. Yes.</p> <p>8 Q. The authors are IARC members; is that</p> <p>9 right?</p> <p>10 A. Yes.</p> <p>11 Q. The authors of this paper, Langseth?</p> <p>12 A. Yes.</p> <p>13 Q. Another overview factor of Bradford</p> <p>14 Hill is consistency; is that right?</p> <p>15 A. Yes.</p> <p>16 Q. The literature does not show a</p> <p>17 consistent association between talc use and</p> <p>18 ovarian cancer; right?</p> <p>19 MS. PARFITT: Objection to form.</p> <p>20 A. I disagree.</p> <p>21 Q. The cohort studies do not show an</p> <p>22 association between talc use and ovarian cancer;</p> <p>23 correct?</p> <p>24 MS. PARFITT: Objection to form.</p> <p>25 A. I disagree. The cohort studies show</p>	<p style="text-align: right;">Page 148</p> <p>1 overall evidence, my testimony is that the cohort</p> <p>2 study estimates are in line with the case-control</p> <p>3 evidence and provide evidence of consistency.</p> <p>4 Q. The cohort studies themselves, looking</p> <p>5 just at those studies, and I'm going to ask you</p> <p>6 about the others --</p> <p>7 A. Sure, sure.</p> <p>8 Q. -- do not show a consistent</p> <p>9 association between talc use and ovarian cancer;</p> <p>10 correct?</p> <p>11 MS. PARFITT: Objection. Misstates the</p> <p>12 testimony.</p> <p>13 A. So that's not the way I look at</p> <p>14 evidence. I look at everything. That's what you</p> <p>15 want to look at. You can look at it.</p> <p>16 I just look at evidence, you know, whatever</p> <p>17 is out there. So I didn't look at cohort studies</p> <p>18 in and of themselves.</p> <p>19 And that's why we do systematic reviews.</p> <p>20 That's why we do meta-analyses, because you want</p> <p>21 to look at everything at the same time.</p> <p>22 Q. You did not look at the cohort studies</p> <p>23 individually; correct?</p> <p>24 A. I did. And they're in my report.</p> <p>25 Q. If you looked at the cohort studies</p>
<p style="text-align: right;">Page 147</p> <p>1 significant -- you know, increased risk, which is</p> <p>2 in the same direction as the case-control</p> <p>3 studies, which, as several of the authors, such</p> <p>4 as Penninkilampi and others and me, interpret as</p> <p>5 evidence of consistency.</p> <p>6 Q. The cohort studies are what?</p> <p>7 A. I'm sorry?</p> <p>8 Q. List out the cohort studies for us.</p> <p>9 A. Penninkilampi is a meta-analysis. They</p> <p>10 are an interpretation of the cohort studies.</p> <p>11 Q. You told me before that to do a proper</p> <p>12 analysis, you have to go and look at the</p> <p>13 individual studies; is that right?</p> <p>14 A. I do. I did.</p> <p>15 Q. And you went and you reviewed the</p> <p>16 cohort studies; is that right?</p> <p>17 A. Yes.</p> <p>18 Q. And it's your testimony that those</p> <p>19 cohort studies do show an association between</p> <p>20 talc use and ovarian cancer. Is that your</p> <p>21 testimony?</p> <p>22 A. So I reviewed the cohort studies in</p> <p>23 line with 30 case-control studies in line with</p> <p>24 70, you know -- sorry -- seven other</p> <p>25 meta-analyses and, you know, synthesizing the</p>	<p style="text-align: right;">Page 149</p> <p>1 individually, they do not show a consistent</p> <p>2 association between talc use and ovarian cancer;</p> <p>3 correct?</p> <p>4 MS. PARFITT: Objection. Misstates the</p> <p>5 evidence.</p> <p>6 A. So how can you look at individually and</p> <p>7 answer questions about consistency? To answer</p> <p>8 questions about consistency, you have to look</p> <p>9 across studies. And when you look across</p> <p>10 studies, you have to bring all studies.</p> <p>11 And that's when you can opine on</p> <p>12 consistency.</p> <p>13 Q. Doctor, my question relates just to the</p> <p>14 cohort studies.</p> <p>15 A. I understand.</p> <p>16 Q. The cohort studies do not demonstrate</p> <p>17 an association between talc use and ovarian</p> <p>18 cancer; correct?</p> <p>19 MS. PARFITT: Objection. Misstates the</p> <p>20 evidence.</p> <p>21 Q. Just the cohort studies.</p> <p>22 MS. PARFITT: Objection. Misstates the</p> <p>23 evidence.</p> <p>24 A. First of all, you know, they do</p> <p>25 increase -- an increase of serous epithelial</p>

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<p style="text-align: right;">Page 150</p> <p>1 ovarian cancer in one of them, and cumulative 2 evidence from cohort studies shows an excess risk 3 of ovarian cancer which is not statistically 4 significant. 5 Q. Hospital-based, case-control studies 6 collectively do not show an association between 7 talc use and ovarian cancer; correct? 8 MS. PARFITT: Objection. Misstates the 9 evidence. 10 A. That is incorrect, because 11 hospital-based, case-control studies also show an 12 association between talc use and ovarian cancer 13 which is not, you know -- and I would have to 14 look again. Please bring out the studies, 15 because I want to look at some of the studies 16 before I, you know, provide specific -- you're 17 asking very specific questions about 18 hospital-based studies, so I have to look at the 19 studies. 20 Q. If you can't answer a question, tell me 21 you can't answer it. But my question is, 22 hospital-based, case-control studies collectively 23 do not show an association between talc use and 24 ovarian cancer; correct? 25 MS. PARFITT: Objection. Misstates the</p>	<p style="text-align: right;">Page 152</p> <p>1 MS. PARFITT: Wait. Are you in the 2 middle? 3 A. Yeah. That's incorrect. It should be 4 the population-based case studies. That's my -- 5 you know, that's a misstatement on my part. 6 Q. So you need to amend your report? 7 A. Yeah. Yeah. 8 Q. So if we go to Page 54 -- 9 A. Yeah. 10 Q. -- Paragraph 8, you state that it's an 11 error when you state, "As opposed to 12 hospital-based controls, which may be less 13 susceptible to selection bias, the 14 population-based, case-control studies have 15 consistently showed a higher estimate of 16 increased risk of ovarian cancer associated with 17 talc use." 18 A. Yeah. And I was applying the less 19 susceptible to the population-based statement. 20 Q. How do you need to correct this 21 statement? 22 A. I don't know how, you know. Yeah, it 23 would be as opposed to hospital-based controls, 24 population-based, case-control studies may be 25 less susceptible to selection bias.</p>
<p style="text-align: right;">Page 151</p> <p>1 evidence. 2 A. No. I disagree. And, again, I'd have 3 to -- can we pull the Penninkilampi paper? 4 Q. Doctor, I'm going to ask you about that 5 paper. 6 A. No. But then how can I answer 7 questions? 8 Q. I need you to answer my questions. 9 If you can't answer a question, then tell me 10 you can't answer the question. 11 A. I'm willing to answer the question. 12 Just bring me the evidence so that I can look at 13 it. 14 I'm sorry. I'm trying my best. 15 Q. In your report, you state that 16 hospital-based, case-control studies may be less 17 susceptible to selection bias than 18 population-based, case-control studies; correct? 19 A. Where do I state that? 20 Q. Look at your report on Page 54, 21 Paragraph 8. 22 A. Actually, I state entirely the 23 opposite. I state that the population-based 24 studies may have -- 25 Q. So --</p>	<p style="text-align: right;">Page 153</p> <p>1 Q. You believe that population-based 2 studies may be susceptible to less selection 3 bias? 4 A. May be less susceptible. 5 Q. Take a look at Exhibit 21. That's the 6 article we looked at a few minutes ago. 7 Do you see that? 8 A. That's the Langseth? 9 Q. Yes. The Langseth article. 10 Do you see that? 11 A. Yes. 12 Q. Take a look under the hospital-based 13 studies. 14 Do you see that on Page 359? 15 A. Yes. 16 Q. You are the one who cites this paper 17 and relies on it; is that right? 18 A. Yes. 19 Q. If we look at pooled odds ratio for 20 hospital-based studies -- 21 A. Mm-hmm. 22 Q. -- the odds ratio is 1.2 and the 23 confidence interval is a .92 to 1.36; is that 24 right? 25 A. Yes.</p>

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<p style="text-align: right;">Page 154</p> <p>1 Q. That means that it may or may not be -- 2 show an association between talc use and ovarian 3 cancer. The pooled result; is that right? 4 MS. PARFITT: Objection to form. 5 Q. Given that confidence interval. 6 MS. PARFITT: Objection to form. 7 A. Yeah. Again, this is -- you know, at 8 that time. I don't know what studies have been 9 added. We can look in the new paper, which I'm 10 not sure why it's not been brought up. 11 But, yes, it does show an excess risk, not 12 statistically significant, consistent with the 13 population studies. 14 Q. All right. Hospital-based control 15 studies, you're more likely to be comparing 16 hospitalized patients to hospitalized patients; 17 is that right? 18 A. Yes. That's why they're hospital 19 based. 20 Q. Population-based studies, you're more 21 likely to be comparing ill people to healthy 22 people; is that right? 23 A. Yeah. Your source of control. I 24 mean -- well, it depends. How do you know if 25 it's ill people? If you are sourcing from the</p>	<p style="text-align: right;">Page 156</p> <p>1 behavioral change bias, which attenuates towards 2 the null. It induces an element of 3 misclassification of exposure, which goes towards 4 null. It limits the duration of assessment, 5 which, you know, limits assessment. So it 6 doesn't have power to suggest. 7 So, yes, recall bias is a feature that is 8 better assessed in the cohort studies, but recall 9 bias, for exposures that are daily use, such as 10 talc, are less likely, you know, to be in play. 11 Recall bias -- let me finish my explanation. 12 Recall bias would less likely be in play 13 because we don't see evidence with nonperineal 14 talc exposure. Recall bias are less likely to be 15 in play because we only see it with epithelial 16 ovarian cancer. 17 So, yes, cohort studies less, but there are 18 other biases. 19 Q. Couldn't recall bias explain the 20 difference between cohort studies and 21 retrospective case-control studies? 22 MS. PARFITT: Objection. Form. 23 A. I don't think so. There's multiple 24 other biases and multiple other strengths and 25 limitations that would have to be considered.</p>
<p style="text-align: right;">Page 155</p> <p>1 population in both, it's a population-based 2 study. 3 Q. Population-based, case-control studies, 4 the ones that you look at only show a weak 5 association between talc use and ovarian cancer; 6 is that right? 7 MS. PARFITT: Objection. Misstates the 8 evidence. 9 A. I think we went about that weak. I 10 don't believe that they are weak. We went 11 through that. 12 Q. That's your -- 13 A. Yeah. My opinion is that they're not 14 weak evidence. 15 Q. Isn't the absence of an association in 16 the cohort studies especially significant in that 17 the study design reduces the likelihood of recall 18 bias? 19 MS. PARFITT: Objection to form. 20 A. Yes. I mean, it is important to look 21 at recall bias in the cohort studies. But the 22 study design introduces several elements of other 23 bias for an outcome such as ovarian cancer. 24 You know, I'm answering your question, 25 because you asked about bias. It introduces</p>	<p style="text-align: right;">Page 157</p> <p>1 Q. You cite to Berge, a 2017 paper, in 2 your report; is that right? Is that correct? 3 A. Yes. 4 MR. ZELLERS: Take a look at 5 Exhibit 22. 6 (Article entitled "Genital use 7 of talc and risk of ovarian cancer: A 8 meta-analysis" marked Exhibit 22.) 9 MR. ZELLERS: Ms. Court Reporter, where 10 do you want me to put it, maybe here, on top? 11 COURT REPORTER: Sure. 12 MR. TISI: Thank you. 13 BY MR. ZELLERS: 14 Q. Deposition Exhibit 22 is a paper that 15 you cite by Berge, is the first named author, 16 2017. It's a recent meta-analysis; is that 17 right? 18 A. Yes. 19 Q. Go to Page 6 of the Berge paper, 20 Exhibit 22. 21 The authors conclude that, "Information bias 22 from retrospective self-report of talc use is a 23 possible explanation for the association detected 24 in case-control studies." Is that right? 25 A. Yes.</p>

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<p style="text-align: right;">Page 158</p> <p>1 Q. What was your methodology for 2 discounting the effect of recall bias in the 3 population-based, case-control studies? 4 A. I mean, it's not like there's a -- once 5 recall is operational, there are no methods that 6 you can and do discount. But just the quality 7 and, you know, the quantity of evidence over 8 studies and the fact that even the cohort 9 studies, despite these limitations, show an 10 increased risk suggests that recall bias, while 11 it is potential, cannot explain -- be the only 12 explanation for a causal link between talc and 13 ovarian cancer. You cannot adjust for recall 14 bias after the completion of the study. 15 Q. What is the rate of error in that 16 methodology? 17 A. I think that none of them have 18 calculated it. And Dr. Cramer has done in his 19 last study. And it appears that you'd have to 20 need a significant degree of recall bias. And I 21 am going to reference my report. 22 Q. Okay. Didn't the cohort studies 23 involve a much greater -- 24 A. I'm not done. 25 MS. PARFITT: Excuse me.</p>	<p style="text-align: right;">Page 160</p> <p>1 that the case-control studies are more powered. 2 Q. Do you agree that some case-control 3 studies have shown statistically significant 4 findings and others have not? 5 A. Yes. 6 Q. What is your methodology for weighing 7 the lack of consistency in statistical 8 significance across studies? 9 MS. PARFITT: Objection. Form. 10 A. I can answer that. Yeah. 11 So the methodology for correcting the lack 12 of significance, that's why you do a 13 meta-analysis. That's an inverse variance 14 weighted meta-analysis. You -- so all of these 15 studies have accounted for the fact that their 16 confidence intervals are crossing 1. And that's 17 how they have accounted for lack of a statistical 18 significance. 19 So you can see that all of these estimates 20 are weighted by sample size. So -- 21 Q. Do you agree that if a study does not 22 show a statistically significant association, it 23 could mean that no risk exists? Correct? 24 MS. PARFITT: Objection. Form. 25 A. In the context of that study. But,</p>
<p style="text-align: right;">Page 159</p> <p>1 A. I'm done. 2 MS. PARFITT: One moment. He wanted to 3 reference something in his report. 4 A. Yeah. The risk of exposure would have 5 to be very high to nullify the increased risk. 6 Q. Didn't the cohort studies involve a 7 much greater number of women than the 8 case-control studies? 9 MS. PARFITT: Objection. Misstates the 10 evidence. 11 A. Yeah. But their combined number of 12 ovarian cancer cases was 890. So power is only 13 -- depends on the number of cases. 14 Q. What was your methodology for weighing 15 the power of the cohort studies versus the 16 case-control studies? 17 A. I mean, retrospective calculations of 18 power are, you know, not really recommended once 19 you already have the results. I mean, we already 20 see that the overall cumulative evidence 21 from many meta-analyses suggests an increased -- 22 you know, provides an increased risk. 23 And we know that there's thousands of cases 24 in the case control. There's, you know, I don't 25 know how many cases in the cohort, so we know</p>	<p style="text-align: right;">Page 161</p> <p>1 again, I am looking at the cumulative evidence. 2 Q. It could mean -- strike that. 3 It could just be occurring by chance; is 4 that right? 5 MS. PARFITT: Objection. Form. 6 A. I'm looking at the whole body of 7 evidence. 8 In the context of a single study, yes. 9 Q. If a study is underpowered it could be 10 because the difference in risk is too small to 11 detect such as a risk ratio smaller than 1.15; 12 isn't that right? 13 A. Yes. It's possible. 14 Q. All right. You have a criticism in 15 your report of the Nurses' Health Study; is that 16 right? 17 MS. PARFITT: Objection to form. 18 A. I don't have -- again, I don't have 19 criticisms. I have pointed out the strengths and 20 limitations. 21 Q. Well, let's look at some of those. 22 On Pages 40 and 41 of your report, you 23 discuss the Gates 2008 study; is that right? 24 A. 40. Yes. 25 Q. The Gates 2008 study showed a</p>

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<p style="text-align: right;">Page 162</p> <p>1 statistically significant increased risk of total 2 epithelial ovarian cancer; is that right? 3 A. Let me just look at it. There's so 4 many of these. Yes. 5 Q. The Gates 2008 study used data 6 collected in the Nurses' Health Study; is that 7 right? 8 A. Yes. There was another part to it as 9 well. 10 Q. In the Nurses' Health Study, the 11 participants were asked about their talc exposure 12 in one questionnaire in 1982; is that right? 13 A. Yes. 14 Q. When they were asked about their talc 15 use, the participants were between 36 and 61 16 years of age; is that right? 17 A. Yes. 18 Q. As you state in your report, you agree 19 that, although talc exposure -- and I'm looking 20 at Page 41 -- 21 A. Yes. 22 Q. The first paragraph. You agree that, 23 "Although talc exposure was only measured in the 24 1982 Nurses' Health Study questionnaire, when 25 participants were between 36 to 61 years of age,</p>	<p style="text-align: right;">Page 164</p> <p>1 Study questionnaire; correct? 2 A. Yes. 3 Q. And you cite that on Page 48 of your 4 report, second paragraph; is that right? 5 A. Yes. 6 Q. You state, "Further, as discussed 7 above, determining never use, based only on a 8 one-time question, near the start of the study, 9 14 years prior to terminating the study in 1996, 10 introduces unidirectional behavioral change bias, 11 likely misclassifying some ever users who used 12 talc during the study as never users and biased 13 the findings toward the null." 14 Is that what you state in your report? 15 A. Let me just read it. Yes. 16 Q. So when you discuss the Gertig 2000 17 study, you say that, because the participants in 18 the Nurses' Health Study were only about or only 19 asked about talc use once, near the beginning of 20 the study, women who started using talc after 21 they completed that questionnaire could have been 22 misclassified as never users; is that right? 23 A. Yeah. 24 Q. But when you talk about the study that 25 you believe supports your opinion --</p>
<p style="text-align: right;">Page 163</p> <p>1 the number of users who began talc use after this 2 is likely small, as shown by the fact that more 3 than 95 percent of controls with regular talc in 4 the NECC reported talc use before age 35." 5 A. Yes. 6 Q. Is that correct? 7 A. Yes. 8 Q. Later in your report, on Pages 47 and 9 48, you discuss the Gertig 2000 study; is that 10 right? 11 A. Yes. 12 Q. That study also uses the data from the 13 Nurses' Health Study; correct? 14 A. Yes. It's all part of the same cohort. 15 Q. That study, Gertig 2000, did not find a 16 statistically significant relationship between 17 daily talc use and all types of ovarian cancer; 18 is that right? 19 A. Yeah. Again, I mean, they are 20 different -- they're the same cohort with 21 different follow-up time, different design. But 22 it did not. And it found an increased risk for 23 serous ovarian cancer. 24 Q. Gertig 2000, that study also relied on 25 the national -- strike that -- the Nurses' Health</p>	<p style="text-align: right;">Page 165</p> <p>1 A. Yeah. 2 Q. -- Gates 2008, you recognize that the 3 vast majority of women who use talc initiate use 4 before age 36; is that right? 5 A. Yeah. But it does not -- both points 6 are valid. I mean, I'm just stating the 7 limitations of the Gates study and the Gates 8 analysis. So. 9 I don't see an incongruity that you're 10 trying to point out. I'm just saying the 11 proportion of women who were never users, the 12 number of users who began is likely small. But 13 it still does not eliminate the possibility of 14 unidirectional behavioral change bias. 15 Q. When you're looking at a cohort study, 16 Gertig 2000 that does not support your opinion, 17 you're talking about limitations; correct? 18 MS. PARFITT: Objection. Misstates his 19 testimony. 20 A. I'm not talking about a study that does 21 not support mine. I'm looking at the strengths 22 and limitations of a study. 23 Q. You state two different things, 24 depending upon whether you're talking about Gates 25 2008 or Gertig 2000; correct?</p>

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<p style="text-align: right;">Page 166</p> <p>1 MS. PARFITT: Objection. Misstates his 2 testimony. 3 A. I am not. 4 First of all, they are two different 5 analyses of a cohort. So they're not two 6 different things about. 7 And I'm pointing out, you know, the reasons 8 that that -- so I'm, you know, pointing out in 9 Gates that, yes, talc exposure is a single-time 10 exposure. And it is -- you know, introduces an 11 element of bias. 12 But I'm also pointing out in Gates why that 13 bias is likely to be, you know, small coming from 14 the other consortium. 15 Q. But you don't say that when you discuss 16 Gertig 2000, do you? 17 A. Yeah. Because it wasn't done in 18 conjunction with the NECC consortium. 19 Q. All right. Look at Page 49 of your 20 report. You discuss the Houghton 2014 study; is 21 that right? 22 A. Yes. 23 Q. All right. Houghton did not find a 24 statistically significant increase in the risk of 25 ovarian cancer with perineal talc use; is that</p>	<p style="text-align: right;">Page 168</p> <p>1 participants in the Houghton 2014 study was 63.3 2 years at baseline, with 12.4 years of follow-up 3 on average; is that right? 4 A. Yes. 5 Q. And then you say that, because 6 participants were not asked again about talcum 7 powder use during follow-up, people who initiated 8 talc use after the study began were being 9 misclassified as never users. Is that right? 10 A. Yes. 11 Q. So, again, when the study supports your 12 opinion, you recognize that the vast majority of 13 perineal talc users begin that use well before 14 age 63. 15 MS. PARFITT: Objection. Misstates 16 testimony. 17 A. I don't recognize that. How do I 18 recognize that? I'm just citing that, in Gates, 19 they provided that opinion. Yeah. 20 In the Gates study, they quoted data from 21 the NECC, that that's one study that provides. I 22 don't know what's happening in the -- in this 23 Houghton study, that vast majority. That's 24 something that you are providing. And you 25 provide data that the vast majority of users</p>
<p style="text-align: right;">Page 167</p> <p>1 right? 2 A. Yes. 3 Q. Houghton did not find a statistically 4 significant increase in the risk of ovarian 5 cancer with use of talcum powder on sanitary 6 napkins or diaphragms; is that right? 7 A. Yeah. They found an increased risk 8 which was not statistically significant. 9 Q. And Houghton 2014 did not find a 10 statistically significant increase in risk of 11 ovarian cancer with increasing durations of use 12 or when stratified by age or tubal ligation 13 status; correct? 14 MS. PARFITT: Objection. Form. 15 A. I don't know that specific. I mean, 16 you'd have to show me. Again, I don't remember 17 these studies offhand. 18 Q. Like the Nurses' Health Study, the 19 Houghton 2014 authors ask participants about 20 their talcum powder use at the participants' 21 entry into the study; is that right? 22 A. Yes. And they don't update during a 23 follow-up, introducing, you know, bias. 24 Q. On Page 50 of your report, second 25 paragraph, you note that the average age of the</p>	<p style="text-align: right;">Page 169</p> <p>1 began -- 2 Q. It's something you cited in your 3 report; correct? 4 A. Yeah. But it doesn't mean that that 5 applies to, you know, this Houghton study as 6 well. 7 Q. And that's my point. You take a piece 8 of information in terms of when women begin their 9 talc use. You apply it differently in your 10 analysis of studies that favor plaintiffs' 11 position than studies that do not favor 12 plaintiffs' position? 13 A. I'm sorry. I have to object. 14 MS. PARFITT: Objection. 15 A. I have to object. This is a 16 mischaracterization of my testimony. I mean, I 17 have to object to this. Because -- no, I have 18 to. 19 MS. PARFITT: Let him finish. Let 20 him -- 21 A. Because you are mischaracterizing my 22 testimony. 23 Yes, I point out the limitations in one 24 section that, you know, a majority of women. And 25 I also point out the unidirectional change bias,</p>

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<p>1 and both are entirely congruent with each other. 2 But yes -- 3 Q. Tell -- 4 A. Yes. 5 Q. Are you finished? 6 A. Yes. 7 Q. All right. On what are you relying to 8 opine that enough women begin talcum powder use 9 in their 50s and 60s such that the results of 10 Houghton or Gates 2000 are biased toward the 11 null? 12 A. Well, I mean, we know -- exactly. I 13 mean, we don't know that. I mean, we can't -- 14 even a small amount, and that's important to 15 know, that even a small amount of users was 16 class- -- because we didn't ask those questions. 17 So even a small amount of users who had moved to 18 the other category would have nullified -- you 19 know, would have biased it towards the null. 20 Q. Based on all your review, the data that 21 you came across and that you cite in your report, 22 are that the vast majority of women begin talc 23 use in their 20s or earlier; correct? 24 A. No. I cite that in the NECC. That's 25 the data I came across. And that's why it is</p>	<p>1 MR. ZELLERS: So I'll ask just a few 2 questions about this study -- 3 MS. PARFITT: And if it's not here -- 4 MR. ZELLERS: -- then we'll take a 5 break, because we've been going for a while. 6 (Article entitled "Perineal Talc 7 Use and Ovarian Cancer, A Systematic Review 8 and Meta-Analysis" marked Exhibit 23.) 9 BY MR. ZELLERS: 10 Q. Doctor -- 11 A. I think we need a break in five 12 minutes. I need a break. I don't know about 13 you. 14 Q. We don't want to wear you out. 15 A. It's only half. Not even half the way. 16 Q. I'm handing you Exhibit 23. This is 17 the Penninkilampi meta-analysis that you have 18 referred to in your report and also in your 19 testimony; is that right? 20 A. Yes. 21 Q. You rely on this meta-analysis, 22 Deposition Exhibit 23, in forming your opinions; 23 is that right? 24 A. As one of the studies. Yes. 25 Q. It's a 2018 meta-analysis; is that</p>
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<p>1 cited. So to mischaracterize it as not being 2 cited is incorrect. 3 Q. What is the latency period for ovarian 4 cancer? 5 A. I don't know a specific number. It's, 6 you know, several years. 7 Q. Several years. 8 That's your testimony based upon all of the 9 data and material you've reviewed? 10 A. Yes. I mean -- 11 MS. PARFITT: Objection. 12 Q. You've -- you've been referring to 13 Penninkilampi; is that right? 14 A. I don't know the name. Yes. 15 Q. But let me give it to you and we can 16 both see if we can pronounce it together. 17 MS. PARFITT: Before we start, it's 18 about 12:20. We do have lunch coming. May I 19 just take two minutes to see if it's here? 20 MR. ZELLERS: Sure. Or you can let me 21 ask a couple of questions about this study and we 22 can take a break, but whatever your preference 23 is. 24 MS. PARFITT: What's your preference? 25 THE WITNESS: Let's do it.</p>	<p>1 right? 2 A. Yes. 3 Q. Are you aware that this meta-analysis 4 by Penninkilampi does not include the Gates 2010 5 update of the Nurses' Health Study? 6 A. When you say the Gates 2002 -- the 7 study that we -- 8 Q. What we looked at before was Gates 9 2008. And we also looked at Gertig 2000 -- 10 A. All these different studies. 11 Q. That's all right. 12 You're aware that there are several 13 different cohort studies relating to the Nurses' 14 Health Study; is that right? 15 A. Yes. 16 Q. What we talked about earlier was the 17 Gertig 2000 study. 18 A. Okay. 19 Q. Correct? 20 A. Yes. And before that, we talked 21 about -- 22 Q. The Gates 2008. 23 A. Okay. 24 Q. Are you aware that Gates, in 2010, 25 updated the Nurses' Health Study, which we have</p>

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<p style="text-align: right;">Page 174</p> <p>1 referred to as Gertig 2000?</p> <p>2 A. Yeah. I have. It's cited in my report</p> <p>3 as well, 92.</p> <p>4 Q. Are you aware that Penninkilampi does</p> <p>5 not include the Gates 2010 update of the Nurses'</p> <p>6 Health Study?</p> <p>7 MS. PARFITT: Refer to your --</p> <p>8 A. Can I take a look?</p> <p>9 MS. PARFITT: Of course, you can.</p> <p>10 Q. Sure.</p> <p>11 A. Yeah. It cites Gertig.</p> <p>12 Q. But it does not cite Gates 2010; is</p> <p>13 that right?</p> <p>14 A. I don't see it.</p> <p>15 Q. Do you weigh this study, the</p> <p>16 meta-analysis by Penninkilampi, less because it</p> <p>17 does not include the Gates 2010 study?</p> <p>18 A. I mean, all of these meta-analyses,</p> <p>19 most of them have found, you know, similar odds</p> <p>20 ratio. You know, some of them have made</p> <p>21 different decisions.</p> <p>22 They have made -- for example, they made</p> <p>23 decisions about more than 50 cases. Other -- if</p> <p>24 you look at the Taher meta-analysis, they</p> <p>25 decided, based on -- that a New Castle Tawas</p>	<p style="text-align: right;">Page 176</p> <p>1 So I think it's quite reliable and, you</p> <p>2 know, they were justified. They said we're going</p> <p>3 to look at case control with more than 50 cases.</p> <p>4 So I don't consider it unreliable for that</p> <p>5 reason.</p> <p>6 MR. ZELLERS: Let's take a break.</p> <p>7 THE VIDEOGRAPHER: Here ends Media</p> <p>8 No. 2. Off the record, 12:24 p.m.</p> <p>9 (Lunch recess was taken.)</p> <p>10 THE VIDEOGRAPHER: Here begins media</p> <p>11 No. 3 in today's deposition of Sonal Singh, MD,</p> <p>12 M.P.H. Back on the record, 1:02 p.m.</p> <p>13 BY MR. ZELLERS:</p> <p>14 Q. Dr. Singh, another Bradford Hill</p> <p>15 overview factor that you considered is</p> <p>16 dose-response; is that right?</p> <p>17 A. Yes.</p> <p>18 Q. Which studies show a dose-response?</p> <p>19 A. Let me just refer to my report.</p> <p>20 So in -- you know, in assessing</p> <p>21 dose-response, it's very challenging with an</p> <p>22 exposure such as perineal talc, particularly</p> <p>23 because, you know, you need to know the amount,</p> <p>24 you need to know the duration, you need to know</p> <p>25 the intensity of exposure. So there are</p>
<p style="text-align: right;">Page 175</p> <p>1 Skill Rating will include studies.</p> <p>2 So you have to review that. Just because</p> <p>3 they excluded Gates 2010, I wouldn't weigh it</p> <p>4 differently. That's my answer.</p> <p>5 Q. Gates 2010 tends to negate an</p> <p>6 association between perineal talc use and ovarian</p> <p>7 cancer; correct?</p> <p>8 MS. PARFITT: Objection. Misstates the</p> <p>9 evidence.</p> <p>10 A. So negates the evidence? I mean, in</p> <p>11 fact, if you look at influence analyses conducted</p> <p>12 by Taher, it sort of doesn't matter which study</p> <p>13 you take out and which study you take in. All of</p> <p>14 the estimates are statistically significant.</p> <p>15 Q. If you're going to do a reliable</p> <p>16 meta-analysis, you should include the pertinent</p> <p>17 studies; correct?</p> <p>18 MS. PARFITT: Objection. Misstates his</p> <p>19 testimony.</p> <p>20 A. Just give me a second.</p> <p>21 Yeah. I mean, you have to include the</p> <p>22 permanent study -- but as we know, as we know,</p> <p>23 people have made different decisions, like Taher</p> <p>24 made separate decisions, Berge has made</p> <p>25 separate -- the previous analysis made.</p>	<p style="text-align: right;">Page 177</p> <p>1 challenges.</p> <p>2 The second is the challenge of modeling</p> <p>3 dose-response. When we say dose-response -- or</p> <p>4 exposure outcome, is it linear monotonic</p> <p>5 relationships?</p> <p>6 And, you know, several studies, some measure</p> <p>7 duration, some measure intensity, some measure</p> <p>8 duration and frequency. So as I cite in my</p> <p>9 dose-response section, which I'm trying to</p> <p>10 find -- I'm sorry -- yeah, Page 56 of my report.</p> <p>11 Q. Which studies show a dose-response?</p> <p>12 A. I mean, this is, you know,</p> <p>13 references -- with increased frequency, 51 to 55.</p> <p>14 Duration, 52 to 54. Frequency and duration,</p> <p>15 58 -- 48 to 54.</p> <p>16 Q. Doctor, which studies did you review</p> <p>17 that show a dose-response?</p> <p>18 A. These are the studies that I cited.</p> <p>19 Q. What page are you looking at?</p> <p>20 A. Page 56.</p> <p>21 Q. Are there studies that do not show a</p> <p>22 dose-response?</p> <p>23 A. Yes.</p> <p>24 Q. Do you cite those studies that do not</p> <p>25 show a dose-response in your report?</p>

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<p style="text-align: right;">Page 178</p> <p>1 A. Yes, I do. 2 Q. On what page? 3 A. Just give me a second. I know I have 4 cited them, and I'm just trying to find where. 5 Yeah. None of the cohort studies were able 6 to conduct meaningful dose-response because they 7 did not collect durational. 8 Q. Are those the only studies, the cohort 9 studies that did not find a meaningful 10 dose-response? 11 A. No. There were several -- 12 MS. PARFITT: Objection to form. 13 A. There were other case-control studies. 14 No. If you take out 41, 55 -- I mean, these 15 references cite above -- that are, you know, 16 included in the sections, and I talk about their 17 dose-response in the respective section. 18 Q. What is your justification for 19 disregarding the studies that did not show a 20 dose-response? 21 MS. PARFITT: Objection. Form. 22 A. So I did not disregard these studies. 23 They are included in the report. So, obviously, 24 the cohort studies already are, and we can go 25 through the case-control studies, which did not</p>	<p style="text-align: right;">Page 180</p> <p>1 Q. On 337, there's a table that shows the 2 risk of ovarian cancer for women who used talc 3 daily for one year, one to five years, five to 20 4 years, and more than 20 years. Is that right? 5 A. Yes. 6 Q. There was only statistical significance 7 for the time periods of one to five years of use 8 and more than 20 years of use; correct? 9 A. Yes. 10 Q. If there is a dose-response, shouldn't 11 there continue to be statistical significance 12 with increased exposure? 13 MS. PARFITT: Objection. Form. 14 A. Yeah. So that is -- I'm just 15 concluding what they concluded. The trend for 16 frequency of use was significant, but the trend 17 for use -- years use was flat. And if you look 18 at Page 337, the last line of that paragraph, 19 "Even with this imprecision, the trend remained, 20 although the increase was less monotonic." 21 Q. When we look at the data, there is only 22 a dose-response -- strike that. 23 The data only shows statistical significance 24 for one to five years of use. It does not show 25 statistical significance for one year or five to</p>
<p style="text-align: right;">Page 179</p> <p>1 show dose-response and are included. 2 Q. One of the studies you reviewed and 3 considered and relied upon was the Cramer 2016 4 study; is that right? 5 A. Yeah. 6 (Article entitled "The 7 Association Between Talc Use and Ovarian 8 Cancer, A Retrospective Case-Control Study 9 in Two US States" marked Exhibit 24.) 10 BY MR. ZELLERS: 11 Q. Exhibit 24 is the Cramer 2016 study; 12 correct? 13 A. Yes. 14 Q. This is a retrospective case-control 15 study published in 2016; is that right? 16 A. Yes. 17 Q. You claim in your report that this 18 study shows a trend for increasing risk by talc 19 years on Page 46, the last paragraph; is that 20 right? 21 A. Yes. 22 Q. Let's take a look at whatever the study 23 shows. Turn to Page 337 of Exhibit 24, the 24 Cramer 2016 study. 25 A. 337? Yes.</p>	<p style="text-align: right;">Page 181</p> <p>1 20 years; correct? 2 MS. PARFITT: Objection. Misstates the 3 evidence. 4 A. Yeah. So let's go to -- 5 Q. Is that correct? 6 MS. PARFITT: Objection. 7 A. Yes. But let's go to the section of my 8 testimony in which -- report which discusses how 9 dose-response analysis should be interpreted, 10 because they lose statistical power. So subgroup 11 tests lose statistical significance, and I'll 12 point out -- 13 Q. You -- 14 MS. PARFITT: Excuse me. I think he's 15 still -- 16 A. Yeah. I'm trying to explain something. 17 Yeah. We are talking on the subject of 18 dose-response. And one must be careful in 19 interpreting data from the subgroup analysis such 20 as analysis of dose categories or, you know, as 21 subgroups. The results are important. If the 22 test is not significant, there's lack of 23 significant difference. However, such subgroup 24 tests can be underpowered because of reduction in 25 sample size.</p>

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<p>1 Q. Doctor, if there is a dose-response in 2 a study such as the Cramer 2016 paper, looking at 3 the data, shouldn't there continue to be 4 statistical significance with increased exposure? 5 MS. PARFITT: Objection. 6 A. No, no, you don't -- it doesn't have to 7 be statistical significance with, you know, 8 increased exposure. I mean, you look at the test 9 score interaction. 10 So I don't think that, with each category of 11 exposure, you're already -- you have a power for 12 a study. Now with each, you're decreasing the 13 number of users, so you're not going to get 14 statistical significance. 15 Q. Then why do you get statistical 16 significance at greater than 20 years of daily 17 use? 18 A. Yeah. Because there's differential, 19 you know -- at that point, you know, there's 20 more -- there's, you know, more case subjects 21 have ovarian cancer. 22 Q. Why do you not have statistical 23 significance at five to 20 years? 24 A. Because it's underpowered at that time. 25 Q. Why do you not have statistical</p>	<p>1 that testing to determine how much talcum powder 2 reaches a woman's ovary after each application. 3 Q. Do you have any idea how much asbestos 4 reaches a woman's ovaries each time she uses 5 talc, assuming that talc powder is contaminated 6 with asbestos? 7 MS. PARFITT: Objection. Form. 8 A. I have not conducted that assessment. 9 Q. How much heavy metal exposure reaches a 10 woman's ovaries, assuming that there are heavy 11 metals in talcum powder? 12 MS. PARFITT: Objection. Form. 13 A. I have not conducted that assessment. 14 Q. Do you know that heavy metals, 15 chromium, cobalt and nickel, are in vitamins? 16 A. Yeah. They are in, you know -- they 17 are ubiquitous in various other areas as well. 18 Q. They're in food; right? 19 A. I don't know which one is in which. 20 Yeah. I can't be specific. 21 Q. In drinking water? 22 A. I don't know. I don't want to say yes 23 to whichever. 24 Q. It's in bottled water? 25 A. I don't know that.</p>
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<p>1 significance at one year? 2 A. It's underpowered. 3 Q. But it is appropriately powered at one 4 to five years? 5 A. Yes. Based on the number of cases. 6 Q. Isn't this an instance where you're 7 cherry-picking the data that is favorable to 8 plaintiffs' position and ignoring all of the data 9 which would tend to refute plaintiffs' position? 10 MS. PARFITT: Objection. Form. 11 A. I don't know what the plaintiffs' 12 position -- but what I'm trying to say is this 13 is -- my interpretation of dose-response is based 14 on, you know, not based on statistical 15 significance. So that's all. 16 Q. Which studies show a dose-response for 17 asbestos exposure and ovarian cancer? 18 A. I have not evaluated the causal link 19 between asbestos and ovarian cancer. Other 20 agencies have, and they have opined that it 21 causes ovarian cancer. But I have not. 22 Q. Do you have any idea how much talcum 23 powder reaches a woman's ovaries each time she 24 uses it? 25 A. I have not conducted that -- conducted</p>	<p>1 Q. Are heavy metals, chromium, cobalt and 2 nickel, considered essential nutrients in the 3 body? 4 MS. PARFITT: Objection. 5 A. Yeah. I mean, that's, you know, 6 it's -- pertaining to this case, the question is 7 not that, whether they are in drinking water. 8 I asked myself this question, causal 9 question, what constitutes talcum powder 10 products. And to that effect, if there are 11 substances such as, you know, chromium, cobalt, 12 and other heavy metals that have been, you know, 13 classified as Grade I or Grade II carcinogens 14 that provide further evidence of a causal link, 15 whether they are present in air, ambient air, 16 that's not the assessment I've done, and I'm not 17 making a causal claim that chromium, per se, is 18 causing that ovarian cancer in that causal 19 framework. 20 Q. You have no evidence whatsoever that 21 the blood or tissue levels of any trace heavy 22 metals are higher in genital talc users compared 23 to nonusers; correct? 24 MS. PARFITT: Objection. Form. 25 A. Blood or genital talc. I'm sorry. Can</p>

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<p style="text-align: right;">Page 186</p> <p>1 you repeat?</p> <p>2 Q. Sure. I'll ask it again.</p> <p>3 You have no evidence that the blood or</p> <p>4 tissue levels of any trace heavy metals are</p> <p>5 higher in genital talc users compared to</p> <p>6 nonusers; correct?</p> <p>7 MS. PARFITT: Objection. Form.</p> <p>8 A. Yeah. But I do know that there is</p> <p>9 perineal talc application, and at least from the</p> <p>10 documents I have reviewed, that, you know,</p> <p>11 asbestos is present in talc, at least from the</p> <p>12 documents I've reviewed, from the studies that</p> <p>13 I've reviewed, and from a -- as you say, the</p> <p>14 excerpts of the deposition.</p> <p>15 And, you know, whether these are in blood</p> <p>16 levels or, as you said, in the uterine tissue,</p> <p>17 no, I don't know that.</p> <p>18 Q. Another Bradford Hill overview factor</p> <p>19 is biological plausibility; right?</p> <p>20 A. Well, it's actually plausibility.</p> <p>21 Q. Plausibility means that a biological</p> <p>22 mechanism exists; correct?</p> <p>23 A. Well, that's what we mean. But if you</p> <p>24 actually go back and read Bradford Hill, he was</p> <p>25 talking even about social factors. Yes, but, you</p>	<p style="text-align: right;">Page 188</p> <p>1 infer from whatever the biological evidence that</p> <p>2 I've reviewed, that there's, you know, evidence</p> <p>3 that supports biologic probability. There are</p> <p>4 some studies that, you know, don't support that</p> <p>5 claim.</p> <p>6 Q. My question simply was if you defer to</p> <p>7 other experts on the topic of biologic</p> <p>8 plausibility.</p> <p>9 MS. PARFITT: Objection.</p> <p>10 Q. You do; correct?</p> <p>11 MS. PARFITT: Objection. That's not</p> <p>12 his testimony.</p> <p>13 A. I won't just defer to them. I'm just</p> <p>14 providing my own opinion. Yeah. I mean, they</p> <p>15 can provide -- you know, it depends. If it's a</p> <p>16 plaintiff expert, a defense expert. I mean, how</p> <p>17 do I know? I can't defer to somebody without</p> <p>18 reading their opinion; right?</p> <p>19 Q. Is all ovarian cancer caused by the</p> <p>20 same mechanism?</p> <p>21 A. No. And neither is any kind of cancer.</p> <p>22 Q. Different subtypes of cancer have</p> <p>23 different biological mechanisms; correct?</p> <p>24 A. Yes. But we are dealing with biologic</p> <p>25 plausibility.</p>
<p style="text-align: right;">Page 187</p> <p>1 know, we've gone forward and interpreted that as</p> <p>2 biologic plausibility.</p> <p>3 Q. The biological mechanisms of cancer are</p> <p>4 not your area of expertise; is that right?</p> <p>5 MS. PARFITT: Objection.</p> <p>6 A. Yes. But, again, the question for me</p> <p>7 was not, you know, to elucidate every precise</p> <p>8 step either in the occurrence of ovarian cancer</p> <p>9 or the talc installation into the development.</p> <p>10 The precise question was, you know, the</p> <p>11 epidemiology shows these findings. Whatever is</p> <p>12 the data in biology, does it support or does it</p> <p>13 refute, you know, these findings in epidemiology?</p> <p>14 Q. On that topic, biologic plausibility,</p> <p>15 you defer to other experts; is that right?</p> <p>16 MS. PARFITT: Objection.</p> <p>17 A. Yeah. I would defer to other people</p> <p>18 for more details on, you know, precise mechanisms</p> <p>19 of ovarian cancer.</p> <p>20 But I do have -- and I'm an epidemiologist.</p> <p>21 I mean, I can't -- so that's why I just can't</p> <p>22 look at whether it's Cramer or Penninkilampi or</p> <p>23 Berge in isolation. We have to look at the whole</p> <p>24 evidence, including epidemiology, including --</p> <p>25 but, yes, I can -- I have that experience to</p>	<p style="text-align: right;">Page 189</p> <p>1 Again, I don't need to know the precise</p> <p>2 biological mechanisms to arrive at a causal</p> <p>3 opinion.</p> <p>4 Q. If talc is associated with all subtypes</p> <p>5 of epithelial ovarian cancer, or with different</p> <p>6 subtypes in different studies, doesn't that</p> <p>7 suggest that the association is by chance?</p> <p>8 MS. PARFITT: Objection. Misstates the</p> <p>9 evidence.</p> <p>10 A. I mean, again, I don't know enough</p> <p>11 details about the biologic plausibility of each</p> <p>12 ovarian cancer subtype to say that, you know,</p> <p>13 talc would be, by chance, alone. I'd defer to,</p> <p>14 you know, people who evaluate these.</p> <p>15 Q. There is no one biological mechanism</p> <p>16 that could tie all of these subtypes together, is</p> <p>17 there?</p> <p>18 A. I will defer to people with more</p> <p>19 experience. I don't know that. What I know is</p> <p>20 biological plausibility mechanisms that inform</p> <p>21 the hypothesis that I was looking at.</p> <p>22 Q. How does talc reach the ovaries?</p> <p>23 A. Well, you know, talc migrates from, you</p> <p>24 know -- my understanding and opinion is that, you</p> <p>25 know, perineal application of talc, you know,</p>

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<p>1 migrates upwards and upwards through the, you 2 know, vaginal canal and migrates to. 3 Q. Is that an area of your expertise? 4 A. Again, no. But I have reviewed the 5 studies, several studies that -- some studies 6 that I cite, several studies that were added. 7 And it's quite well accepted, at least in the 8 gynecological community, that there's, you know, 9 particulate matter can migrate upwards. 10 Q. What studies support the theory that 11 talcum powder applied externally migrates from 12 the perineal region to the ovaries? 13 A. Again, I reviewed various studies on 14 migration. 15 Q. Can you name them for me? 16 A. I'm going to look at it. 17 Yeah. So I cite several studies in this 18 section on migration. And, again, this in the 19 context of biologic plausibility. Is it 20 plausible that particulate matter, such as talc, 21 can migrate? And, again -- 22 Q. What page are you looking at? 23 A. Sorry. 57. 24 Q. What studies are you relying on? 25 A. Yeah. So I'm relying on the studies</p>	<p>1 A. Yeah. I know that. 2 Q. Ness is an expert for plaintiffs in the 3 talc litigation; is that right? 4 MS. PARFITT: Objection. 5 A. I'm not aware of that. 6 Q. So Justin, that dealt with glove 7 powder; is that right? 8 A. Which one was that, 68? 9 Q. 68. 10 A. Yes. 11 Q. Isn't it true that that study did not 12 involve perineal use, but an exam with force to 13 the cervix? 14 A. Yeah. You know, and I'm relying on it, 15 again, for biologic plausibility. It does not 16 involve talc. So, you know, it's glove powder 17 in -- 18 Q. Isn't it true that they found some 19 particles in women who were examined with 20 powder-free gloves? 21 A. Yes. 22 Q. Heller, didn't Heller find talc in 23 tissues in all 24 patients, including the 12 who 24 did not use perineal talc? 25 A. Yes.</p>
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<p>1 described by, you know, Heller, 64. 2 Q. Any others? 3 A. 65. 4 Q. What is 65? 5 A. I'll have to go take a look. 6 It's Henderson, I think, but I don't want 7 to -- these are big documents. Yeah, it is 8 Henderson. 9 And then 66 is presence of talc in lymph 10 nodes and then -- 11 Q. Who is the author? 12 A. Cramer. 13 And then supportive evidence of migration of 14 other, you know, particulate matter comes from, 15 you know, 68, 87 and -- 16 Q. 68 is what? 17 A. 68 is Justin. 18 Q. Eighty -- is it -- 87 is what? 19 A. Ness. 20 Q. Is who? 21 A. Ness. Ness 2000. 22 Q. Cramer is a litigation consultant and 23 expert for plaintiffs in the talc litigation; is 24 that right? 25 MS. PARFITT: Objection.</p>	<p>1 Q. What is the evidence in the ovarian 2 tissues that have been studied of granulomatous 3 reaction which is what you would see if there was 4 a huge amount of talc? 5 A. Well, I mean, I'm not opining that 6 there is a huge amount of talc, but others have 7 found talc in the ovaries. I am just -- my 8 opinion is that it is biologically plausible. I 9 mean, you know, the FDA has stated that it is 10 biologically plausible for particles, retrograde 11 particles to migrate. 12 And so I'm opining on that. I'm not saying 13 that talc is in the ovaries and it's inducing 14 this granulomatous reaction. I mean, these 15 people have found that it can occur. 16 And this is sufficient evidence for my 17 opinion to support on biologic plausibility. 18 Other studies, which I cite in my report, 19 which, you know, for example, monkey models, 20 couldn't, you know detect -- didn't detect 21 translocation. So there are studies that don't. 22 Q. Can you cite any article that shows 23 granulomas, fibrosis, or adhesions anywhere up 24 the reproductive tract of a woman as a result of 25 her external genital talc application?</p>

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<p style="text-align: right;">Page 194</p> <p>1 MS. PARFITT: Objection. Form. 2 A. I did not review those studies, if 3 there are. 4 Q. In your report, you say that, "The 5 migration theory is supported by findings of a 6 deceased risk" -- strike that. 7 In your report, you say that, "The migration 8 theory is supported by findings of a decreased 9 risk of ovarian cancer with tubal ligation and 10 hysterectomy." Pages 18 and 19. 11 Is that right? 12 A. Yes. 13 Q. Don't the studies pertaining to tubal 14 ligation show mixed results? 15 A. No. 16 MS. PARFITT: Objection. 17 A. As far as -- 18 MS. PARFITT: Sorry. 19 A. I mean, as far as I'm aware, you know, 20 tubal ligation and hysterectomy are protective 21 risk factors for ovarian cancer. 22 Q. That's your opinion based upon your 23 review and analysis of the literature; is that 24 right? 25 A. Yeah.</p>	<p style="text-align: right;">Page 196</p> <p>1 history of breast cancer, had a tubal ligation or 2 hysterectomy, were pre-menopausal or were 3 post-menopausal and used HT." 4 Is that correct? 5 A. Yeah. 6 Q. So, in fact, Cramer did find a 7 significantly greater association between talcum 8 powder use and ovarian cancer for women who had a 9 tubal ligation; is that right? 10 A. Yeah. But my -- my point, in Page 57, 11 is that, you know, first of all, that's more than 12 just one Cramer. There are several studies that 13 -- in inferring biologic plausibility, tubal 14 ligation and hysterectomy are protective of 15 ovarian cancer. It is not that talc in this had 16 a higher risk among those. 17 I mean, those, again, those are not two 18 incongruent arguments. I mean, Cramer is making 19 a separate argument that, in his study, he found 20 a higher risk among those who had tubal ligation 21 or hysterectomy. 22 Q. If you're correct in the opinion that 23 you set forth in your report, you would have 24 expected the Cramer study to show a decreased 25 risk of ovarian cancer for women who had tubal</p>
<p style="text-align: right;">Page 195</p> <p>1 Q. Take a look at the Cramer article that 2 we referred to before, Exhibit 24. This is 3 Cramer 2016. 4 Do you have that in front of you? 5 A. Oh, my copy? 6 Q. Yes. You have a copy. 7 A. Yes. Which page? 8 Q. Take a look -- well, Cramer found a 9 significantly greater association between talcum 10 powder use and ovarian cancer for women who had a 11 tubal ligation or hysterectomy. Isn't that true? 12 A. Where is that? 13 Q. Look at the bottom of Page 337 of 14 Exhibit 24 to the top of page -- look at 337. 15 A. And which table? 16 Q. I'm sorry. Look at the bottom of 17 Page 337, that carries over to the top of Page 18 339. This is Cramer describing his results; is 19 that right? 20 A. Yes. 21 Q. Tell me if I'm reading this correctly, 22 and I'm starting at the bottom of Page 337. 23 "By test for interaction, Column 3, the 24 association was significantly greater for women 25 who were African American, had no personal</p>	<p style="text-align: right;">Page 197</p> <p>1 ligation or hysterectomy; correct? 2 MS. PARFITT: Objection. Form. 3 Misstates his testimony. 4 A. Yeah. I mean, I don't -- I mean, 5 that's probably, in that study. Yeah. 6 Q. How do you account for the fact that 7 Cramer and the authors of this 2016 paper found a 8 significantly greater association among women who 9 had a tubal ligation or hysterectomy? 10 A. I have no -- you know, you can find 11 different studies have different findings, but, 12 overall, we know that tubal ligation and 13 hysterectomy are protective. 14 Q. The Gertig 2000 Nurses' Health Study, 15 that's also a study that you have reviewed; is 16 that right? 17 A. Yes. 18 Q. That study did not show a reduction of 19 ovarian cancer in talc users who have had a tubal 20 ligation; correct? 21 A. Which page is that? 22 Q. I'm just asking, based upon your review 23 of that study. 24 A. I can't answer. You know, there are so 25 many different -- can I ask for the Taher</p>

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<p style="text-align: right;">Page 198</p> <p>1 appendix, because that actually breaks it down by 2 tubal ligation and hysterectomy. 3 You're asking very specific questions. I 4 need to have specific materials. 5 MR. TISI: I have them. 6 Q. What are you asking for? 7 A. You asked a question about tubal 8 ligation. 9 Q. I understand. What are you asking 10 counsel for plaintiffs to get you? 11 A. The Taher appendix. 12 Q. You want to go back and look at the 13 Taher -- 14 A. Appendix. Because they did stratify 15 the analysis by hysterectomy and tubal ligation. 16 Q. That's the 2018, unpublished paper; is 17 that right? 18 A. Yes. 19 Q. All right. Did the Houghton -- as 20 they're looking for this -- 21 A. Yeah. Sure. 22 Q. Did the Houghton two thousand -- strike 23 that. 24 The Houghton 2014 study also did not show a 25 reduction of ovarian cancer in talc users who</p>	<p style="text-align: right;">Page 200</p> <p>1 talc users who had a tubal ligation; correct? 2 A. I mean, I think I need to look at the 3 data. I think -- I don't have it. We are trying 4 to get it, so we'll have to wait. 5 I mean, you're asking me questions. I mean, 6 you have to show me documents. I mean -- 7 Q. Well, you made a statement in your 8 report -- 9 A. How can I make a statement in the 10 report around Taher, because it wasn't even 11 available at that time? 12 Q. What I'm trying to do is ask you -- 13 A. Sure. 14 Q. -- about the statement in your report, 15 where you say that, "Migration theory is 16 supported by findings of a decreased risk of 17 ovarian cancer with tubal ligation and 18 hysterectomy." 19 A. And I'm just stating that I just need 20 to look at a figure in the Taher appendix and 21 then I'll be able to answer that. That's all. 22 Q. Well, we saw that Cramer doesn't show 23 that; right? 24 A. Yes. 25 Q. You're not aware that Gertig 2000 or</p>
<p style="text-align: right;">Page 199</p> <p>1 have had tubal ligation; correct? 2 A. Again, you know, I don't want to agree 3 or disagree with you without just looking at it. 4 I don't think I comment on it. 5 Q. Would you agree or can you agree that 6 both Gertig 2000 and Houghton 2014 were large 7 prospective cohort studies; right? 8 A. Yeah. But we've already discussed 9 their limitation in terms of they were not 10 designed to study the talc ovarian cancer. They 11 had prevalent user biases. You know, they lost a 12 lot of users and cases of ovarian cancer. You 13 know, they had misclassification. 14 And, yes, they were large studies, but had 15 small number of ovarian cancer cases. 16 MR. KLATT: Objection. Nonresponsive. 17 MR. ZELLERS: Join. 18 Q. You read the Ter Riet 2013 19 meta-analysis; is that right? 20 A. Yes. 21 Q. You rely on that; correct? 22 A. Yes. 23 MS. PARFITT: Objection. 24 Q. The Ter Riet 2013 meta-analysis also 25 did not show a reduction of ovarian cancer in</p>	<p style="text-align: right;">Page 201</p> <p>1 Houghton 2014 shows that. Are you? 2 MS. PARFITT: Objection. Misstates his 3 testimony. 4 A. You have not shown me that. You have 5 not shown me documents to say one way or the 6 other. 7 Q. When you did your analysis, didn't you 8 look at the studies to try to see if they 9 supported or refuted the points you were making? 10 A. I -- you know, I did not look at every 11 subanalysis by, you know -- by whether it's, you 12 know, pre-menopausal, post-menopausal. 13 Q. You cite Cramer 2016 as supportive of 14 your position and opinions. 15 A. Sure. 16 Q. Is that right? 17 A. Well, again -- 18 MS. PARFITT: Objection. Mis -- 19 A. I don't. 20 MS. PARFITT: Let me get my objection 21 in. 22 THE WITNESS: Sorry. Go ahead. 23 MS. PARFITT: No. My objection is in, 24 I think. 25 Q. But then you ignore those portions or</p>

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<p style="text-align: right;">Page 202</p> <p>1 parts of Cramer 2016, Gertig 2000, Houghton 2014, 2 Ter Riet 2013, Rosenblatt 2011, Wong 1999, Cook 3 1997, Harlow 1992, that don't support your 4 position. 5 MS. PARFITT: Counsel completely 6 misstates his opinion. The question misstates -- 7 A. I don't even know what was the 8 question, and I can't answer that because I don't 9 know what the question was. 10 Q. The question is: When you opined in 11 your report that the migration theory is 12 supported by findings of a decreased risk of 13 ovarian cancer with tubal ligation and 14 hysterectomy, did you pick out just a couple of 15 cases to look at and cite or did you try to see 16 if there was consistency to that finding across 17 all of the studies? 18 A. Yeah. So when I cite that, and you can 19 see the citation, I am trying to make an 20 inference about separate from talc use, and 21 ovarian cancer, you know, is hysterectomy and 22 tubal ligation protective of that. 23 So that's the inference. It's not that each 24 of these studies, I'm trying to ignore, you know, 25 the studies that you mentioned. I'm just trying</p>	<p style="text-align: right;">Page 204</p> <p>1 by findings of a decreased risk of ovarian cancer 2 with tubal ligation and hysterectomy. 3 A. Yeah. But it doesn't talk about, you 4 know -- so if you look at the reference, in 5 case-control studies and meta-analysis, let's 6 look at the references. You know, so, yes, 7 there's one. And if -- let's look at -- 8 Q. Okay. Can you cite one reference? 9 A. Yeah. Let's look at that. 10 Q. All right. 11 A. Then let's look at 115. So when I cite 12 115, that's not even about talc. That's about 13 tubal ligation and hysterectomy, in general, is 14 it -- you know, so taking talc out of the 15 equation, I'm trying to opine or understand 16 whether tubal ligation and hysterectomy are 17 protective factors, and then I can infer on talc, 18 yes, should only Ness have been cited? Yes, 19 there are other studies otherwise. 20 Q. And there are other studies, many 21 studies -- 22 A. Yes. 23 Q. -- that do not support your position; 24 is that right? 25 MS. PARFITT: Objection. Form. His</p>
<p style="text-align: right;">Page 203</p> <p>1 to say, as you're looking at mechanisms, what 2 would happen with tubal -- I'm trying to do the 3 best to explain, tubal ligation and ovarian 4 cancer. 5 If, in the individual studies, yes, as in 6 Cramer, and if we see that in the other studies, 7 then, you know, they provide a different opinion. 8 But I'm trying to make an opinion, based on the 9 general knowledge of tubal ligation and 10 hysterectomy being, you know, protective. 11 Q. Do you agree with me, to have a 12 scientifically valid opinion -- 13 A. Sure. 14 Q. -- you need to look at all of or at 15 least the important studies; correct? 16 A. Yeah. I did look at these studies. 17 Q. And, in fact, a number of the studies 18 that you cite in your report -- 19 A. Sure. 20 Q. -- don't support your position; 21 correct? 22 MS. PARFITT: Objection. Form. 23 Support his position on tubal ligation? 24 Q. Well, right now, we're talking about 25 migration, that the migration theory is supported</p>	<p style="text-align: right;">Page 205</p> <p>1 position on tubal ligation? 2 MR. ZELLERS: Yes. 3 MS. PARFITT: Thank you. 4 A. Yeah. So it's -- it's -- I think 5 there's -- I mean, whether Ness and others should 6 have been cited there, that's a valid point. But 7 when I make a point about tubal ligation and 8 hysterectomy, it's a general point on the, you 9 know, migration hypothesis. 10 BY MR. ZELLERS: 11 Q. You should at least cite to or make 12 some reference -- 13 A. Yeah. 14 Q. -- right, to the studies that do not 15 support that position? 16 A. Yeah. And I think that I have made it 17 in the individual sections, and I can try to look 18 for it, but it will take us time there. 19 Q. Isn't there evidence that if tubal 20 ligation has a protective effect, the protective 21 effect in ovarian cancer stems from the fact that 22 the ligation procedure itself changes the 23 fallopian tube cells? 24 A. I am not an expert -- 25 MS. PARFITT: Objection.</p>

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<p>1 A. -- in, you know, this area to provide, 2 you know, why it would do that. 3 Q. Did you review or are you familiar with 4 Tiourin, T-I-O-U-R-I-N, a 2015 study? 5 A. Did I cite that? I don't remember. 6 Q. Are you -- is that study familiar to 7 you? 8 A. I just can't remember the names. There 9 are so many studies. If you show it to me, I 10 can -- 11 Q. I'll show it to you. You can tell me 12 if it's familiar to you. And if it's not, I'll 13 move on. 14 (Article entitled "Tubal 15 Ligation Induces Quiescence in the 16 Epithelia of the Fallopian Tube Fimbria" 17 marked Exhibit 25.) 18 MR. ZELLERS: 25 is the -- 19 A. No, it's not. I don't know about. 20 BY MR. ZELLERS: 21 Q. For the record, 25 is a 2015 study by 22 Tiourin, T-I-O-U-R-I-N. 23 That's not a study that you reviewed or 24 considered; is that right? 25 A. You know, I have to go through all the</p>	<p>1 concentration in the rectal, vulvar, vaginal, 2 cervical, and uterine tissues which are closer to 3 the area of the initial exposure; correct? 4 MS. PARFITT: Objection. Misstates his 5 testimony. 6 A. I just don't have an opinion in terms 7 of where it will be high or low. Because that's 8 not my area of expertise. 9 Q. Talc particles should be causing 10 inflammation in all those organs and areas; 11 correct? 12 MS. PARFITT: Objection. 13 A. Again, that's -- that's, you know, I'm 14 opining on biological plausible mechanisms of 15 talc-induced ovarian cancer. I didn't look at, 16 you know, whether it's vaginitis or vulvar or 17 whether it's, you know, rectal inflammation. And 18 that's not my area of expertise again. 19 Q. In fact, there are no studies that show 20 inflammation as a result of genital talc use in 21 any of those areas; correct? 22 MS. PARFITT: Objection. Misstates the 23 evidence. 24 A. Again, I have not -- you know, my 25 testimony and report on talcum powder products</p>
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<p>1 references, but I can't recall straight off 2 whether it does. 3 Q. If talcum powder migrates from the 4 perineal region to the ovaries, shouldn't 5 exposure to talc be far greater in concentration 6 in the rectal, vulvar, vaginal, cervical and 7 uterine tissues? 8 MS. PARFITT: Objection to form. 9 Q. Because those are closer to the area of 10 initial exposure? 11 MS. PARFITT: Same objection. 12 A. Yes. So, again, my -- I did not 13 examine, you know, which areas of -- now, as an 14 epidemiologist, I examine general exposures to, 15 you know, products and their associations. 16 Whether, you know, we want to know, yes, route of 17 exposure, whether it's perineal application. 18 But, you know, the evidence that I examined 19 was, you know, I did not distinguish within 20 whether it was perineal or vaginal, vulvar. That 21 would have been different. 22 Q. Let's go step by step. 23 You do agree that if talcum powder migrates 24 from the perineal region to the ovaries, the 25 exposure to talc would be far greater in</p>	<p>1 and inflammation is looking at, are there 2 biological plausible mechanisms. 3 And, again, if there's no studies that 4 provide that talc, in and of itself, causes 5 inflammation, then there are no studies. But, 6 you know, but there's still biologic 7 plausibility. 8 MR. KLATT: Objection. Unresponsive. 9 Q. Are there any studies that you are 10 aware that show a link between external genital 11 talc use and rectal, vulvar, vaginal, cervical, 12 or uterine cancer? 13 MS. PARFITT: Asked and answered. 14 Objection. 15 A. I'm not aware of those. I have not 16 reviewed those studies. 17 Q. As part of your report, you discuss a 18 study published by Huncharik and others in 2007; 19 is that right? 20 A. Yes. Let's bring it out, I mean, if 21 you want to talk about that. 22 Q. I believe it's on Page 26 of your 23 report. 24 A. Sure. 25 Q. Huncharik 2007 is a meta-analysis of</p>

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<p style="text-align: right;">Page 210</p> <p>1 studies on the relationship between ovarian 2 cancer and using diaphragms that are dusted with 3 talcum powder; is that right? 4 A. Yes. 5 Q. A diaphragm is inserted directly onto a 6 woman's cervix; is that right? 7 A. Yes. 8 Q. On Page 26 of your report, you say 9 that, "This meta-analysis is flawed because it 10 only focuses on powder-dusted diaphragms"; 11 correct? 12 A. Well, no. That's not the only flaw. I 13 mean, there are several other flaws, including 14 exclusion of loss category, data extraction 15 analysis, which is, you know, really inclusion of 16 inability studies that did not disaggregate. 17 I mean, the question is if you're asking 18 about perineal exposure, yes, perineal -- 19 diaphragms is one route of exposure. But that's 20 not the only route of exposure that you should be 21 concerned about. 22 Q. Do you state in your report, "The most 23 important limitation with the Huncharik 2007 24 meta-analysis was its exclusive focus on talc 25 powder-dusted diaphragms as the route of</p>	<p style="text-align: right;">Page 212</p> <p>1 means that you cannot exclusively focus on one 2 route of exposure. So it does not mean that it 3 cannot in and of itself. You have to look at 4 perineal-dusted diaphragm. You have to look at, 5 other, you know, perineal applications. 6 Q. So putting aside inhalation for the 7 moment, your opinion is that talcum powder 8 travels from the perineal region to the ovaries 9 through the woman's reproductive tract; is that 10 right? 11 A. I mean, I don't even know through the 12 ovaries. I know it migrates upwards. That's, 13 you know, my opinion. 14 Q. So talcum powder must travel past the 15 labia, through the vagina, through the cervix, 16 and then to the uterus; is that right? 17 A. Yes. It migrates upwards through the 18 vagina, you know, the tract. 19 Q. And then the powder travels through the 20 uterus and into the fallopian tubes to reach the 21 ovaries; is that right? 22 A. Well, I mean, I'm not -- again, I don't 23 intend to elucidate, you know, the precise link 24 that a study has shown that talcum powder -- I 25 think we answered this earlier, I answered this</p>
<p style="text-align: right;">Page 211</p> <p>1 exposure, which could not inherently address the 2 causal question of whether genital talcum powder 3 dusting is associated with increased risk of 4 ovarian cancer"? 5 Is that what you said? 6 MS. PARFITT: Counsel, do you have a 7 copy of the -- otherwise, may I show him the 8 Huncharik study so he's got it in front of him? 9 MR. ZELLERS: I'm just asking general 10 questions right now. That was just a question, 11 does he say that in his report. If he needs to 12 review the study, then he can look at the study. 13 MS. PARFITT: I would appreciate that. 14 MR. ZELLERS: Sure. 15 MS. PARFITT: I just didn't want to 16 pass something to him without your permission. 17 A. Yeah. I do state that. 18 Q. You say that, "Studies on the use of 19 talcum powder-dusted diaphragms cannot address 20 the question of whether perineal use is 21 associated with an increased risk of ovarian 22 cancer"; correct? 23 A. Where is that? 24 Q. It's what we just read. 25 A. No. It doesn't mean that. It just</p>	<p style="text-align: right;">Page 213</p> <p>1 earlier -- that I am not aware of one study that 2 shows that. But, you know, several shows that 3 talc ends up in the ovaries. 4 Q. Well, given how talc, talcum powder 5 must travel to reach the ovaries, how can you 6 exclude data about the relationship between 7 ovarian cancer and talcum powder that is applied 8 directly to the cervix? 9 MS. PARFITT: Objection. Misstates his 10 testimony. 11 A. Nobody is excluding data. So this is 12 not exclusion of this data. 13 But I am saying that this particular 14 question of talc-dusted diaphragms, A, is an 15 exclusive focus on one route of exposure, so it 16 does not answer the causal question about 17 perineal exposure. 18 And, two, it is not excluded. It's included 19 and discussed and several flaws are noted, 20 including, you know, data extraction errors for 21 the most part, inclusion of studies. 22 And so -- and as can you see in my 23 methodological rating of meta-analyses, it is 24 weighted differently than others. So it is not 25 excluded.</p>

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<p>1 Q. But you state, as the most important 2 limitation of the Huncharik 2007 study, is the 3 exclusive focus on talc powder-dusted diaphragms. 4 A. Yeah. 5 Q. And those diaphragms are applied 6 directly to the cervix; is that right? 7 A. Yeah. Because -- because of its 8 exclusive focus. If the study had, you know, 9 other routes of exposure, yeah. 10 What I'm trying to say is its exclusive 11 focus on one route of exposure cannot -- if 12 you're just asking the question about dust, 13 dusted diaphragm, then don't make inferences 14 about perineal routes of exposure. You have to 15 look at broader exposures. 16 Q. On what studies are you relying to say 17 that talcum powder affects the body differently 18 when it is applied to the perineal region and 19 travels to the cervix compared to when it is 20 applied directly to the cervix? 21 A. I have not made a distinction between 22 those studies. 23 Q. And, in fact, when applied to the 24 perineal region, the talcum powder would also be 25 in close contact with a woman's urethra; is that</p>	<p>1 don't know anything about. I don't -- you know, 2 I haven't reviewed it to answer that question. 3 Q. Do you have an opinion on whether 4 inhaled talc can migrate to the ovaries? 5 A. Yeah. I mean, I think the primary 6 route of exposure is, you know, reproductive, but 7 there are some potential, I would say, you know, 8 potential plausible mechanisms that, you know, 9 when perineal application is applied, it can get 10 inhaled through the lungs and potentially reach 11 the ovaries. But I think that that mechanism is 12 probably not as plausible as the reproductive 13 mechanism. 14 Q. Well, in fact, studies of talcum powder 15 use failed to show a statistically significant 16 association between nongenital use of talcum 17 powder and ovarian cancer; correct? 18 MS. PARFITT: Objection. Form. 19 A. Yeah. And I've cited those studies. 20 Q. If inhaled talc could migrate to the 21 ovaries, wouldn't you expect to see increased 22 ovarian cancer risk with nongenital use of talcum 23 powder? 24 MS. PARFITT: Objection. 25 A. Well, I mean, it also depends on, you</p>
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<p>1 right? 2 MS. PARFITT: Objection. Form. 3 A. Yeah. I mean, anatomically. 4 Q. Substances are capable of traveling up 5 the urethra; correct? 6 A. I mean, yes. Just as we agree that, 7 you know, talc can migrate upwards, substances 8 can migrate through the urethra. If you agree 9 talc can migrate upwards, then, you know, 10 substances can migrate through the urethra. 11 Q. Women get urinary tract infections when 12 bacteria travels up the urethra; correct? 13 A. Yeah. 14 Q. But studies do not show an increase in 15 bladder cancer with talcum powder use, do they? 16 MS. PARFITT: Objection to form. 17 A. I did not ask the causal question about 18 that. And, you know, I have not evaluated. 19 Maybe there are studies that show decreased risk 20 for all that I know. I just can't answer that 21 question. 22 Q. And studies do not show an increase in 23 rectal cancer with talcum powder use; is that 24 right? 25 A. I don't answer the questions that I</p>	<p>1 know, the quantity of inhalation, the degree of 2 talc that's -- and I don't know enough about that 3 to say that, yes, there's a sufficient quantity, 4 you know, migration to cause that. I don't know 5 which studies have evaluated sort of inhaled talc 6 and ovarian cancer. 7 Q. Well, let's look back at Cramer 2016, 8 Page -- or Exhibit 24. Do you have that in front 9 of you? 10 A. Yeah. 11 Q. In that study, Cramer found no apparent 12 risk associated with nongenital talc use; isn't 13 that correct? 14 A. Yeah. And I think I cite that in my 15 report, too. 16 Q. You don't disagree that Cramer, in his 17 study, 2016, did find no apparent risk associated 18 with nongenital talc use; correct? 19 A. Yeah. 20 Q. The same result was found in the pooled 21 analysis that was done by OCAC, Ovarian Cancer 22 Association Consortium; is that right? 23 MS. PARFITT: Objection. Which study 24 are you referring to? What year? There have 25 been many studies by OCAC.</p>

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<p style="text-align: right;">Page 218</p> <p>1 MR. ZELLERS: I'm referring to Page 341 2 of the Cramer article. Page -- strike that. 3 The second and third paragraphs. 4 BY MR. ZELLERS: 5 Q. Tell me when you have that, Doctor. 6 A. 341. Discussion? 7 Q. Yes. So in the second and third 8 paragraph, I'm reading the second sentence. 9 "Talc use regularly" -- strike that. 10 "Talc used regularly in the genital area was 11 associated with a 33 percent increase in ovarian 12 cancer risk overall while no apparent risk was 13 associated with talc used only in nongenital 14 areas." 15 A. Yeah. And I agree with their opinion. 16 Q. All right. Do you also agree with the 17 next sentence? "Our results are consistent with 18 the recent pooled analysis from the OCAC which 19 reported that use of powder on genitals is 20 associated with a 24 percent increased risk and 21 no effect of nongenital use of talc." 22 A. Yeah. 23 Q. Have you ever performed any study 24 yourself pertaining to whether inhaled talc can 25 migrate to the ovaries?</p>	<p style="text-align: right;">Page 220</p> <p>1 mechanisms that have been shown in terms of 2 increase in, you know, inflammatory enzymes, and 3 increase in alterations of redox potential that 4 are some of the potential plausible biological 5 mechanisms. Again, other people who are 6 biological experts will opine on them and detract 7 from the strengths and weaknesses. 8 Q. You have not done an expert review of 9 inflammation evidence yourself; correct? 10 A. When you say -- I mean, expert review 11 of inflammation. 12 MS. PARFITT: Object. 13 Q. You're deferring to other experts on 14 the topic and subject of inflammation; is that 15 right? 16 MS. PARFITT: Objection. 17 A. Yeah. I mean, other experts, I mean, I 18 can look at the evidence and see, A, one, that 19 inflammation plays a role in cancer. Two, 20 inflammation plays a role in ovarian cancer. 21 At least my opinion is that, you know, talc 22 can, you know, induce inflammation; others will 23 provide more detailed opinion. 24 Q. In terms of the mechanism by which 25 ovarian cancer may or may not be related to</p>
<p style="text-align: right;">Page 219</p> <p>1 A. No. And I would have a different job. 2 That's not my area of expertise. 3 Q. And you can't, as we sit here, cite me 4 to such a study; correct? 5 A. Well, I don't know if it's -- I'll go 6 back to my report and just cite that -- that 7 Dr. Luongo, you know, has done analyses which say 8 that inhaled talc can migrate. 9 Q. You're not expressing that opinion here 10 today; correct? 11 A. No. I'm not. I'm not vouching for his 12 testimony. 13 Q. Assuming baby powder can reach the 14 ovaries, what is the method by which baby powder 15 causes ovarian cancer? 16 A. So, yeah. I mean, we talked about, you 17 know, potential biological mechanisms of 18 inflammation. 19 And, again, I don't -- in my inference on 20 biologic plausibility, I don't intend to offer 21 the opinion that, A, I know the precise 22 biological mechanisms which cause biological -- 23 ovarian cancer or the precise steps by which talc 24 causes it. 25 But, you know, there are several, you know,</p>	<p style="text-align: right;">Page 221</p> <p>1 inflammation, you are deferring to other experts; 2 correct? 3 MS. PARFITT: Objection. Misstates his 4 testimony. He just told you -- 5 MR. ZELLERS: I'm asking him the 6 question. Okay? 7 MS. PARFITT: Counsel, he did answer 8 it. And you just asked the question again and 9 you misstated what he said. 10 MR. ZELLERS: Ms. Parfitt, please. I 11 thought we had a discussion. 12 MS. PARFITT: We did. 13 MR. ZELLERS: We ought not to have 14 speaking objections. 15 MS. PARFITT: We don't. But I'll tell 16 you the discussion we did have. You can't 17 misstate -- 18 MR. ZELLERS: I'm allowed to ask the 19 witness what his opinions are and are not. 20 MS. PARFITT: Absolutely. But not to 21 misstate them. That's all. Let's ask it again. 22 THE WITNESS: I'm sorry. I forgot. 23 MR. ZELLERS: It was a question. 24 THE WITNESS: What was the question? 25 MR. ZELLERS: Can you read the</p>

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<p style="text-align: right;">Page 222</p> <p>1 question?</p> <p>2 MS. PARFITT: Listen carefully to the</p> <p>3 question.</p> <p>4 MR. ZELLERS: Okay. Again,</p> <p>5 Ms. Parfitt, let the witness handle himself.</p> <p>6 He's an experienced, capable person.</p> <p>7 MS. PARFITT: Yes. I would certainly</p> <p>8 both agree with that. He's quite good.</p> <p>9 (The question was read by the</p> <p>10 reporter, as requested.)</p> <p>11 MS. PARFITT: Objection. Misstates his</p> <p>12 testimony.</p> <p>13 A. No. To the extent that my causal</p> <p>14 question needs -- you know, evaluated the</p> <p>15 evidence on the link between, you know,</p> <p>16 inflammation, ovarian cancer and talc and</p> <p>17 inflammation, I can opine that, you know, this</p> <p>18 link supports my causal opinion. Whereas, to the</p> <p>19 precise details of such a link, I would obviously</p> <p>20 defer to other experts.</p> <p>21 BY MR. ZELLERS:</p> <p>22 Q. Not all inflammatory conditions lead to</p> <p>23 cancer; correct?</p> <p>24 A. Yes. And there are pro-oxidant</p> <p>25 conditions and there are antioxidants. And I</p>	<p style="text-align: right;">Page 224</p> <p>1 Q. Rheumatoid arthritis doesn't increase</p> <p>2 the risk of ovarian cancer, does it?</p> <p>3 A. I don't know that question. I have not</p> <p>4 evaluated it.</p> <p>5 Q. Psoriasis does not increase the risk of</p> <p>6 ovarian cancer, does it?</p> <p>7 A. For all, it could. We don't know that.</p> <p>8 We can spend time reviewing that. We can't</p> <p>9 answer questions.</p> <p>10 Q. We're here to talk about the science;</p> <p>11 correct?</p> <p>12 A. Yeah. So the science, you have to</p> <p>13 look -- I haven't looked at psoriasis and cancer.</p> <p>14 I haven't looked at, for example, rheumatoid</p> <p>15 arthritis increases cardiovascular disease,</p> <p>16 because I've looked at it. I can't answer</p> <p>17 questions that I haven't looked at.</p> <p>18 Q. Have you done an expert review of the</p> <p>19 role of inflammation in causing ovarian cancer?</p> <p>20 Have you personally done that review?</p> <p>21 A. No. I have just looked at, you know,</p> <p>22 what is the role of inflammation in ovarian</p> <p>23 cancer, and are there plausible biological</p> <p>24 mechanisms that either support or refute whether</p> <p>25 talc can induce inflammation.</p>
<p style="text-align: right;">Page 223</p> <p>1 examined the evidence which relates to if there</p> <p>2 were -- you know, if talcum powder products, for</p> <p>3 example, had antioxidants or, in the Saed study,</p> <p>4 they increased the level of antioxidant enzymes,</p> <p>5 then that would be evidence against the link</p> <p>6 between redox potential and talc and ovarian</p> <p>7 cancer. So there are various pieces of the</p> <p>8 evidence.</p> <p>9 Q. All of us experience inflammatory</p> <p>10 reactions of one sort or another, including</p> <p>11 chronic conditions, and they do not all lead to</p> <p>12 cancer; correct?</p> <p>13 MS. PARFITT: Objection. Form.</p> <p>14 A. Yeah. But it's the balance of -- you</p> <p>15 know, that is altered between pro-inflammatory</p> <p>16 and anti-inflammatory conditions and the</p> <p>17 pro-oxidant state and the antioxidant state in my</p> <p>18 understanding that, you know, is a plausible</p> <p>19 mechanism for talc in ovarian cancer. Again,</p> <p>20 based on my understanding. Others will provide</p> <p>21 details.</p> <p>22 Q. Rheumatoid arthritis is an inflammatory</p> <p>23 condition; right?</p> <p>24 A. Heart disease is -- everything is</p> <p>25 inflammation.</p>	<p style="text-align: right;">Page 225</p> <p>1 Q. How does an acute inflammatory response</p> <p>2 lead to cancer?</p> <p>3 A. Yeah. I mean, and I'm not making a</p> <p>4 case for an acute inflammatory. I'm not sure.</p> <p>5 Did I state that? You know, this is a chronic</p> <p>6 inflammatory process.</p> <p>7 Q. What evidence is there that externally</p> <p>8 applied talcum powder causes chronic</p> <p>9 inflammation?</p> <p>10 A. Yeah. I mean, you know -- can you give</p> <p>11 me a second?</p> <p>12 Q. Sure.</p> <p>13 A. Yeah. I'm not aware of a study that</p> <p>14 talc specifically itself causes chronic</p> <p>15 inflammation.</p> <p>16 Q. There are no reports in the literature</p> <p>17 of externally applied talc leading to</p> <p>18 inflammation, granulomas, fibrosis or adhesions</p> <p>19 anywhere along a woman's reproductive tract;</p> <p>20 correct?</p> <p>21 MS. PARFITT: Objection.</p> <p>22 A. Yeah. There are other studies that,</p> <p>23 you know, not externally applied.</p> <p>24 Q. If up to 50 percent of U.S. women have</p> <p>25 used genital talc, shouldn't this be a common</p>

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<p>1 finding?</p> <p>2 MS. PARFITT: Objection. Form.</p> <p>3 A. So I'll step back and share with you</p> <p>4 what epidemiology.</p> <p>5 Yeah. I mean, ovarian cancer, the incidence</p> <p>6 of ovarian cancer is, what, 11 by 100,000. It's</p> <p>7 a very rare cancer. Even if 50 percent use it,</p> <p>8 you know, it increases, you know, it affects it.</p> <p>9 So we are not -- nobody is saying that,</p> <p>10 yeah, every woman who gets talc will get it. So</p> <p>11 just because there's an increased risk with talc,</p> <p>12 how much of the U.S. population should get</p> <p>13 ovarian cancer is a different question. That's</p> <p>14 not what I estimated.</p> <p>15 That's -- you're asking a question about</p> <p>16 attributable risk and population attributable</p> <p>17 risk. Some have attributed it to 10 percent,</p> <p>18 40 percent. I haven't done that estimation.</p> <p>19 MR. KLATT: Move to strike.</p> <p>20 Nonresponsive.</p> <p>21 MR. ZELLERS: Join.</p> <p>22 Q. Granulomas, fibrosis or adhesions don't</p> <p>23 cause ovarian cancer; correct?</p> <p>24 MS. PARFITT: Objection.</p> <p>25 A. I'm not aware of precise biological</p>	<p>1 A. Yeah. And I think it's the studies on</p> <p>2 NSAIDs. I don't remember the precise -- I don't</p> <p>3 know if -- yeah. It's Ness or --</p> <p>4 Q. I will and do intend to ask you a few</p> <p>5 questions about NSAIDs and about some of those</p> <p>6 studies.</p> <p>7 A. I think that's where --</p> <p>8 Q. Well, let me talk about or ask you a</p> <p>9 question about a study that you do cite in</p> <p>10 support of your inflammation opinion. You rely</p> <p>11 on -- is it Saed 2018 article?</p> <p>12 A. Yes.</p> <p>13 MR. ZELLERS: I'll hand you the Saed</p> <p>14 2018 paper.</p> <p>15 (Article entitled "New Insights</p> <p>16 into the Pathogenesis of Ovarian Cancer:</p> <p>17 Oxidative Stress" marked Exhibit 26.)</p> <p>18 MS. PARFITT: Thank you.</p> <p>19 MR. ZELLERS: We'll mark that as</p> <p>20 Deposition Exhibit 26.</p> <p>21 BY MR. ZELLERS:</p> <p>22 Q. This is a study that you cite in</p> <p>23 support of your position; is that right?</p> <p>24 A. I don't know if I cite it as a support</p> <p>25 of my position. I cite it as an article that</p>
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<p>1 mechanisms of, you know, ovarian cancer.</p> <p>2 Q. Isn't the theory of inflammation as a</p> <p>3 cause of ovarian cancer an unproven hypothesis?</p> <p>4 MS. PARFITT: Objection.</p> <p>5 A. Well, it's a plausible hypothesis that,</p> <p>6 you know -- and it's well accepted that, you</p> <p>7 know, one of the mechanisms is inflammation.</p> <p>8 Q. It's still unproven; correct?</p> <p>9 MS. PARFITT: Objection. Misstates</p> <p>10 testimony.</p> <p>11 A. Well, I'm not -- my standard wasn't</p> <p>12 looking at absolute certainty that, A, talc</p> <p>13 induces inflammation, and inflammation causes</p> <p>14 ovarian cancer. I'm looking for evidence for or</p> <p>15 against whether inflammation, you know, induces</p> <p>16 or reduces ovarian cancer.</p> <p>17 Q. What studies or evidence do you cite in</p> <p>18 your report against the proposition or theory</p> <p>19 that inflammation is a cause of ovarian cancer?</p> <p>20 A. Yeah. I think -- I'm sorry. The</p> <p>21 question was what studies --</p> <p>22 Q. You told me it was important to cite</p> <p>23 both the studies that support your position and</p> <p>24 also the studies that refute your position; is</p> <p>25 that right?</p>	<p>1 shares insight into the parthenogenesis of</p> <p>2 ovarian cancer. I mean, you know, he's the</p> <p>3 expert and he'll form his opinion.</p> <p>4 So it's a study cited in my report. In</p> <p>5 fact, I won't even be able to discuss the details</p> <p>6 of that study with you.</p> <p>7 Q. You're not comfortable discussing the</p> <p>8 details?</p> <p>9 A. Yeah. I mean --</p> <p>10 MS. PARFITT: Objection.</p> <p>11 A. -- you can ask a question and I'll try</p> <p>12 to answer to the best of my ability. And if I</p> <p>13 won't, I'll be able --</p> <p>14 Q. The point is, this is really an area</p> <p>15 for other experts; agreed?</p> <p>16 A. Yes. This is an area for other</p> <p>17 expertise.</p> <p>18 Q. Saed, that paper just looked at</p> <p>19 immortalized cell lines; is that right?</p> <p>20 MS. PARFITT: Objection. Form.</p> <p>21 A. Yes.</p> <p>22 Q. The authors do not identify what either</p> <p>23 the positive or the negative controls were; is</p> <p>24 that right?</p> <p>25 MS. PARFITT: Objection.</p>

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<p style="text-align: right;">Page 230</p> <p>1 A. So is this the study or is this just 2 their review article? 3 Q. This is the paper that you cite to in 4 your report. 5 A. Can you point out in my report which 6 reference number is that? I know I've cited 7 them, but I'm just trying to orient myself. 8 Q. Are you familiar with this paper? Have 9 you looked at it before? 10 A. Yes. I have looked at this paper, but 11 they also have other abstracts and other papers. 12 I think that's what I was relying on. 13 Yeah. So I'm relying on this and 125, Saed. 14 Q. The authors in this paper that you 15 support -- strike that -- that you cite and are 16 relying on do not identify what either the 17 positive or the negative controls were; correct? 18 MS. PARFITT: Objection. Misstates the 19 evidence. 20 A. Let me just look at 125, and then I'll 21 answer the question. 22 No. That's not 125. 23 Q. I'll move on and ask another question. 24 A. Sorry about that. 25 Q. That's all right.</p>	<p style="text-align: right;">Page 232</p> <p>1 users? 2 A. Yeah. So I don't know if that's 3 consistently. But as I mentioned earlier, and I 4 may have cited it in this study, that when I 5 talked about Ness, and I'm trying to find it, 6 but, yes, there is, you know, NSAIDs have not 7 been -- they don't consistently reduce the risk 8 of ovarian cancer, but in some studies, they have 9 shown to reduce the risk of ovarian cancer. 10 Q. If, in fact, inflammation was a 11 causative factor in ovarian cancer, and if NSAIDs 12 and aspirin use reduce inflammation, wouldn't you 13 expect some consistency in the studies that would 14 show NSAIDs and aspirin use reduced the incidence 15 of ovarian cancer? 16 A. So, first of all, you're asking a broad 17 question. Inflammation. What do you mean by 18 that? 19 And I don't know -- yeah. Exactly. So I 20 don't know the precise biological mechanisms of 21 ovarian cancer. And just because the ovarian 22 cancer-mediated inflammation is different from, 23 you know, anti-inflammatory, so both may be 24 entirely consistent, I'm not saying they are, but 25 both mechanisms, you could have NSAID-induced</p>
<p style="text-align: right;">Page 231</p> <p>1 Saed references unpublished data; correct? 2 MS. PARFITT: Objection. 3 A. Yeah. And I've just been informed by 4 counsel that it has been accepted for 5 publication, but the data that I -- that I 6 referenced were, you know, at the time, available 7 as abstracts. 8 Q. Saed referenced -- references 9 unpublished data that you rely on in coming up 10 with at least some of the opinions in your 11 report; is that right? 12 A. Yeah. I mean, it's one of the, you 13 know, number of studies that I reviewed. It's 14 not the only study on, you know, on biological 15 mechanisms. 16 Q. Why doesn't inflammation generally, for 17 example, in pelvic inflammatory disease, cause 18 ovarian cancer? 19 A. Again, that's not -- you know, that is 20 not -- I'm not going to be opining on the precise 21 mechanisms of ovarian cancer in my testimony or 22 my report. That's not my area of expertise. 23 Q. Why don't NSAIDs and aspirin use, which 24 supposedly reduce inflammation, consistently 25 reduce the incidence of ovarian cancer in chronic</p>	<p style="text-align: right;">Page 233</p> <p>1 reduce inflammation and NSAID-induced increase 2 inflammation. That's just not what -- that area 3 where other people will provide, you know, more 4 testimony. 5 Q. If inflammation is the issue, why would 6 cornstarch be a superior alternative to talc? 7 MS. PARFITT: Objection. Form. 8 Q. And to give you context, the FDA banned 9 the use of cornstarch on surgical gloves because 10 of the risk of inflammation, granulomas, 11 fibrosis, adhesions and irritation; is that 12 right? 13 A. I'm not aware of all the particular, 14 you know, regulatory actions on cornstarch. 15 Q. Take a look at the FDA 21 C.F.R, parts 16 878, 880, and 895. 17 MR. ZELLERS: We'll mark that as 18 Deposition Exhibit 27. 19 (Federal Register, Vol. 81, No. 20 243 marked Exhibit 27.) 21 BY MR. ZELLERS: 22 Q. If you look at the second page, first 23 paragraph, last sentence, so I'm under executive 24 summary. The last sentence in the last full 25 paragraph.</p>

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<p style="text-align: right;">Page 234</p> <p>1 "However, the use of powder on medical 2 gloves presents numerous risks to patients and 3 healthcare workers, including inflammation, 4 granulomas, and respiratory allergic reactions." 5 Did I read that right? 6 A. Yeah. 7 MS. PARFITT: Do you know where it is? 8 Mm-hmm. 9 A. Okay. 10 Q. Why, then, given that, would cornstarch 11 be considered a superior alternative to talc? 12 MS. PARFITT: Objection. Form. 13 A. Am I -- did I state in my -- I mean, 14 you know, I'm not evaluating the causal role of 15 cornstarch and, you know, its role in ovarian 16 cancer. I'm not even aware of the existence of 17 this document and what it pertains to. 18 I don't see any reference to cornstarch 19 here. I don't evaluate how they regulate various 20 products, whether it's food or cornstarch. 21 Q. Are you familiar with the term 22 "confounding"? 23 A. Yes. 24 Q. That's where the presence of another 25 association confuses the relationship between the</p>	<p style="text-align: right;">Page 236</p> <p>1 is that right? 2 A. I don't disagree -- what I am trying to 3 define precisely confounding is that, you know, 4 it creates a different relationship, had the 5 confounder not been present, and I'm just trying 6 to say how it does that. 7 It's associated with the outcome. It's 8 associated with the exposure and not, you know, 9 and not on the -- 10 Q. Let's use an example, so we're sure 11 we're talking about the same thing. 12 If you are studying the association between 13 coffee and pancreatic cancer, you need to be 14 mindful of whether cigarette smoking is more 15 common in coffee drinkers than in the rest of the 16 population; correct? 17 A. Yes. 18 Q. Cigarette smoking could be a confounder 19 in that situation; is that true? 20 A. Well, so there are several parts to 21 that. Just because it's more common in coffee 22 drinkers does not make it a confounder. To make 23 a confounder, you have to have three specific. 24 What you're talking is, yeah, it's associated 25 with coffee. But is it associated with</p>
<p style="text-align: right;">Page 235</p> <p>1 exposure and disease being studied; correct? 2 A. I don't -- I don't think that's the 3 definition of confounding. 4 Q. What is wrong with that definition? 5 A. Confusion is not an epidemiologic term. 6 There's no such thing as confusion in 7 epidemiology. You have bias. You have 8 misclassification. You have measurement error. 9 Confounding is a case where you have a 10 variable that's related to the outcome and 11 that's, you know, maybe associated with the 12 exposure and is not on the causal pathway between 13 exposure and outcome. 14 And, you know, it creates an artifactual 15 relationship between exposure and outcome. 16 Q. Confounding and confusion are similar 17 terms; correct? 18 A. No. They're not. Confounding is a 19 scientific term. Confusion is layman from that. 20 I don't think it has -- at least in my term, I 21 don't -- 22 Q. So you disagree that confounding 23 relates to the presence of another association 24 which potentially confuses the relationship 25 between the exposure and disease being studied;</p>	<p style="text-align: right;">Page 237</p> <p>1 pancreatic cancer? Is it on the causal pathway? 2 So a confounder is a very precise 3 epidemiologic term. It's not just everything we 4 pull off the air and say because it's associated 5 with the coffee, it becomes a confounder. 6 Q. Listen to my question. 7 A. Sure. 8 Q. Cigarette smoking could be a confounder 9 in my hypothetical; right? 10 A. If it was associated with pancreatic 11 cancer and not present in the causal pathway and, 12 obviously, associated with coffee. 13 Q. Because if more coffee drinkers are 14 smokers than non-coffee drinkers -- 15 A. It could be the other way around. 16 Q. Exactly. An association between coffee 17 drinking and pancreatic cancer might be due to 18 smoking and not the coffee drinking; correct? 19 A. Yes. 20 Q. Confounding can distort results in 21 epidemiological studies; is that right? 22 A. Yes. And you have to adjust for 23 confounding. 24 Q. Residual confounding is possible in 25 every occupational study; is that right?</p>

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<p style="text-align: right;">Page 238</p> <p>1 MS. PARFITT: Objection.</p> <p>2 A. Sorry. Can you repeat the question?</p> <p>3 MS. PARFITT: Here it is.</p> <p>4 Q. Sure. Residual confounding is possible</p> <p>5 in every observational study; correct?</p> <p>6 A. Observational. Yeah.</p> <p>7 It is possible; right? Is that what you</p> <p>8 said?</p> <p>9 Q. Yes.</p> <p>10 A. Yeah. Residual confounding is possible</p> <p>11 because you can't measure, you know, every</p> <p>12 variable that you can think of.</p> <p>13 Q. And unmeasured confounders may be</p> <p>14 present in every observational study; correct?</p> <p>15 A. Yeah. There's always the potential for</p> <p>16 unmeasured confounding. It doesn't mean that it</p> <p>17 exists.</p> <p>18 Q. It's impossible to say that all known</p> <p>19 and unknown confounding factors have been</p> <p>20 controlled for in any given study; correct?</p> <p>21 A. You don't -- you know, what you don't</p> <p>22 know, you can't control for.</p> <p>23 Q. In this case, new factors possibly</p> <p>24 involved in ovarian cancer are just being</p> <p>25 published in the literature; is that right?</p>	<p style="text-align: right;">Page 240</p> <p>1 But most importantly, just because, A, first</p> <p>2 of all, are they associated with the outcome?</p> <p>3 Then you have to ask, are they causally</p> <p>4 associated, and they would have to be associated</p> <p>5 with the exposure talc to be considered a</p> <p>6 confounder, just because they're a risk factor.</p> <p>7 Every risk factor need not be controlled in a</p> <p>8 study. You have to be associated with the</p> <p>9 exposure to, you know, consider the confounder.</p> <p>10 That is the precise definition of</p> <p>11 confounding, is you have to be associated with</p> <p>12 the exposure. You have to be associated with the</p> <p>13 outcome. And you can't be on the path.</p> <p>14 So just because chlamydia -- let me finish.</p> <p>15 Chlamydia, A, has a risk factor of ovarian</p> <p>16 cancer. If I design a study tomorrow for X and</p> <p>17 ovarian cancer, you know, I'm not going to</p> <p>18 consider it a confounder for my analysis.</p> <p>19 Q. Confounders can distort the results in</p> <p>20 epidemiological studies; correct?</p> <p>21 MS. PARFITT: Objection. Form.</p> <p>22 A. Yeah. We've discussed that, I think.</p> <p>23 THE WITNESS: We'll take a break. If</p> <p>24 you want to finish this confounding thing.</p> <p>25 MR. ZELLERS: No. We can take a break</p>
<p style="text-align: right;">Page 239</p> <p>1 MS. PARFITT: Objection. Vague.</p> <p>2 A. Yeah. I don't -- I don't know what</p> <p>3 you're like -- just give me an example so I</p> <p>4 can --</p> <p>5 Q. Okay. History of chlamydia infection</p> <p>6 and history of weight gain during adolescence are</p> <p>7 two recent examples that are being published in</p> <p>8 the literature as factors possibly involved with</p> <p>9 ovarian cancer; correct?</p> <p>10 MS. PARFITT: Objection. Form.</p> <p>11 A. I haven't seen them. But I mean,</p> <p>12 weight gain has been adjusted for in several of</p> <p>13 the analyses. So I don't know about that. Yeah.</p> <p>14 Q. Well, let's assume --</p> <p>15 A. We're talking about chlamydia.</p> <p>16 Q. Let's assume that that's correct.</p> <p>17 Those factors, history of chlamydia</p> <p>18 infection and history of weight gain during</p> <p>19 adolescence, those factors were not controlled</p> <p>20 for in any of the published talc-ovarian cancer</p> <p>21 studies, were they?</p> <p>22 MS. PARFITT: Objection. Form.</p> <p>23 A. Yeah. So if they're not known, first</p> <p>24 of all, you have to evaluate and, you know, is</p> <p>25 that a true -- true association?</p>	<p style="text-align: right;">Page 241</p> <p>1 now.</p> <p>2 MS. PARFITT: Good. Thank you.</p> <p>3 THE VIDEOGRAPHER: This ends Media 3.</p> <p>4 Off the record, 2:17 p.m.</p> <p>5 (A recess was taken.)</p> <p>6 THE VIDEOGRAPHER: Here begins Media</p> <p>7 No. 4 in today's deposition of Sonal Singh, MD,</p> <p>8 M.P.H. Back on the record, 2:29 p.m.</p> <p>9 BY MR. ZELLERS:</p> <p>10 Q. Dr. Singh, in your report, at Page 54,</p> <p>11 Paragraph 7, you address the subject of</p> <p>12 confounding in studies of talcum powder use and</p> <p>13 ovarian cancer; is that right?</p> <p>14 A. Yes.</p> <p>15 Q. On Page 54 of your report, you state,</p> <p>16 "Although there are some risk factors for ovarian</p> <p>17 cancer," and then it continues, "for any of them</p> <p>18 to be confounding to an extent that could account</p> <p>19 for the positive relations that have been</p> <p>20 reported, they would have to be strongly</p> <p>21 correlated with talc use. Family history,</p> <p>22 ethnicity, obesity and some reproductive risk</p> <p>23 factors are positively associated with the risk</p> <p>24 of ovarian cancer, but the magnitude of these</p> <p>25 associations does not appear high enough to</p>

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<p style="text-align: right;">Page 242</p> <p>1 introduce enough confounding either jointly to 2 explain completely the positive associations." 3 And it should be the positive association. 4 A. Yes. 5 Q. Is that the statement that you make? 6 A. Yes. 7 Q. There's no citation for that statement; 8 is that right? 9 A. Yes. But partly because I couldn't 10 find evidence -- and, you know, about the risk of 11 talcum powder use and these risk factors. And so 12 that -- so the issue that I -- prior to the 13 statement, states that -- these other risk 14 factors, which we know are risk factors for 15 ovarian cancer. 16 Q. Is this your statement that you made 17 here? 18 A. Yeah. Let me just explain what I did 19 here. 20 Q. That was a simple question. 21 A. Yeah. It is my statement. 22 Q. Have I read your statement? 23 A. Yes. But it is about the fact that we 24 don't have, you know, family history, ethnicity, 25 obesity and reproductive factors associated, but</p>	<p style="text-align: right;">Page 244</p> <p>1 Cancer"; is that right? 2 A. If I haven't, then I haven't. Yeah. 3 Q. You did put it on your additional 4 materials and data considered. 5 Do you see that? 6 A. Yes. 7 Q. It's on the last page. 8 MR. ZELLERS: I'm going to mark that 9 paper as Exhibit 28. 10 (Document entitled 11 "Interpretation of Epidemiologic Studies on 12 Talc and Ovarian Cancer" marked 13 Exhibit 28.) 14 MS. PARFITT: Thank you. 15 MR. ZELLERS: You're welcome. 16 BY MR. ZELLERS: 17 Q. Do you see Exhibit 28 in front of you? 18 A. Yes. 19 Q. Exhibit 28 is an article prepared by 20 Kenneth Rothman entitled "Interpretation of 21 Epidemiologic Studies of Talc and Ovarian 22 Cancer." 23 Is that right? 24 A. Yes. 25 Q. Take a look at Page 5 of that paper,</p>
<p style="text-align: right;">Page 243</p> <p>1 these associations, as it relates to talc use, we 2 don't have data on how these -- to be considered 3 a confounder, they have to be associated with 4 talc use. We don't have data on that. 5 Q. My question just is: Did you write 6 that? 7 A. I did. Yeah. 8 Q. All right. Now, do you know who Ken 9 Rothman is? 10 A. Yeah. He has written a textbook on 11 epidemiology. 12 Q. He is a well-respected epidemiologist; 13 is that right? 14 A. Yeah. He's well respected. 15 Q. He has written a textbook on 16 epidemiology that's widely recognized as one of 17 the best; is that right? 18 MS. PARFITT: Objection. 19 A. It is nice. I mean, I have a copy of 20 it. 21 Q. I've looked at your report and your 22 reliance list. In terms of your reliance list, 23 you do not cite to a paper by Ken Rothman and 24 others published in 2000 entitled "Interpretation 25 of Epidemiologic Studies in Talc and Ovarian</p>	<p style="text-align: right;">Page 245</p> <p>1 the second paragraph. 2 Do you see where -- 3 A. Confounding, you're talking about? 4 Q. Yes. Where Rothman discusses 5 confounding? 6 A. Yeah. 7 Q. Other than the list of four risk 8 factors in parentheses, you just copied the 9 language from Dr. Rothman's article and pasted it 10 into Page 54 of your report; correct? 11 MS. PARFITT: Objection. 12 A. No. 13 Q. All right. Do you have your report in 14 front of you, Page 54? 15 A. And you say that I don't cite this 16 article or -- 17 Q. If you don't cite that article, you 18 have just testified under oath that these are 19 your words in your report. 20 So take a look at Page 54 of your report. 21 Take a look at Page 5 of the Rothman paper. 22 A. Yeah. I mean, you know, I may have -- 23 I think I'm talking of different risk factors. 24 Q. Doctor -- 25 MS. PARFITT: Let him finish, please.</p>

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<p style="text-align: right;">Page 246</p> <p>1 MR. ZELLERS: Okay.</p> <p>2 A. I may have failed to cite that article.</p> <p>3 You know, it's okay. I mean, it's not okay, but</p> <p>4 I'm just saying I may have failed to cite that</p> <p>5 article.</p> <p>6 Q. Do you agree that the entire first part</p> <p>7 of Rothman on confounding that you have cited</p> <p>8 word for word in your report, and you can start</p> <p>9 with "although there have been some strong risk</p> <p>10 factors for ovarian cancer, for any of them to be</p> <p>11 confounding."</p> <p>12 A. Yeah.</p> <p>13 Q. If you read the rest, all the way</p> <p>14 through the next couple of sentences, down to</p> <p>15 "positive association," it's --</p> <p>16 A. Yeah.</p> <p>17 Q. -- word for word; right?</p> <p>18 A. Yeah. I wouldn't say I copy and</p> <p>19 pasted. I would say that I have not referenced</p> <p>20 it.</p> <p>21 Q. You copied and pasted it.</p> <p>22 A. No. I did not. I read it, and I wrote</p> <p>23 it. And I did not reference it.</p> <p>24 Q. You didn't write it. It's exactly word</p> <p>25 for word from the Rothman paper --</p>	<p style="text-align: right;">Page 248</p> <p>1 factors, family history, obesity and reproductive</p> <p>2 history," what else is different? Show me one</p> <p>3 word that is different --</p> <p>4 A. Yeah.</p> <p>5 Q. -- between what you've written here and</p> <p>6 what is written by Rothman in his paper.</p> <p>7 A. Yeah. It isn't, and I should have</p> <p>8 cited it.</p> <p>9 Q. All right. The paper by Rothman and</p> <p>10 others -- well, strike that.</p> <p>11 A. And where was this published, just -- I</p> <p>12 mean, it doesn't have a citation in it.</p> <p>13 Q. If you're going to copy it word for</p> <p>14 word --</p> <p>15 A. I did not.</p> <p>16 MS. PARFITT: Excuse me. Object to the</p> <p>17 question. Don't be argumentative, Counsel. He</p> <p>18 said he didn't cut and paste it. He said he</p> <p>19 failed to cite it. That's his testimony.</p> <p>20 A. You can, you know, go forward and say</p> <p>21 that.</p> <p>22 Q. The question is: You don't know -- let</p> <p>23 me withdraw that. You're looking at something.</p> <p>24 A. Yeah. Go ahead and ask the question.</p> <p>25 Q. You thought that this was a reliable</p>
<p style="text-align: right;">Page 247</p> <p>1 A. No. It isn't.</p> <p>2 Q. -- with the exception of you added, in</p> <p>3 parentheses --</p> <p>4 A. Yeah.</p> <p>5 Q. -- "genetic risk factors, family</p> <p>6 history, obesity and reproductive history"; is</p> <p>7 that right?</p> <p>8 A. Yeah. And I didn't cite it, but -- so</p> <p>9 you look at a study and a paper, and, you know, I</p> <p>10 wrote it. And I was remiss in not citing it. I</p> <p>11 didn't copy and paste it.</p> <p>12 Q. Well, you copied it word for word;</p> <p>13 correct?</p> <p>14 A. I did not.</p> <p>15 MS. PARFITT: Objection. Misstates his</p> <p>16 testimony.</p> <p>17 A. I'm saying what I did. But I did not</p> <p>18 cite it.</p> <p>19 Q. The fact are the facts.</p> <p>20 A. Well, the facts are that the content is</p> <p>21 different and I did not cite it.</p> <p>22 Q. What content is different other than</p> <p>23 you adding in --</p> <p>24 A. The risk factors.</p> <p>25 Q. -- parens, "Example, genetic risk</p>	<p style="text-align: right;">Page 249</p> <p>1 source; correct?</p> <p>2 A. Yes. And I did not cite it.</p> <p>3 Q. The Rothman paper, Exhibit 28?</p> <p>4 A. Yes.</p> <p>5 Q. All right. Now --</p> <p>6 A. Well, it's a source. I mean, it's in</p> <p>7 with other source that I rely on.</p> <p>8 Q. At least in these couple of</p> <p>9 sentences --</p> <p>10 A. In the paragraph.</p> <p>11 Q. -- you agree; correct?</p> <p>12 A. Yeah.</p> <p>13 MS. PARFITT: Agree what? Agree what?</p> <p>14 Q. Agree that the -- the two sentences</p> <p>15 from Rothman are the same two sentences as in his</p> <p>16 report and does he agree with those two</p> <p>17 sentences?</p> <p>18 A. Well, obviously, the risk factors are</p> <p>19 different, because I know more about the risk</p> <p>20 factors since 2000. And -- but the point that</p> <p>21 I'm trying to make, and as you can see the</p> <p>22 language is the same, and it should have been</p> <p>23 cited.</p> <p>24 Q. You told us throughout this deposition</p> <p>25 that it's important for you to be -- as an</p>

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<p style="text-align: right;">Page 250</p> <p>1 expert, to be fair and to cite information, 2 positions on -- that both support and refute your 3 position and plaintiffs' position; correct? 4 A. Well, it's not about their position, 5 support or refute the causal hypothesis. 6 And I'm agreeing that I was remiss in not 7 citing this. 8 Q. You also did not cite the next sentence 9 of Rothman -- 10 A. Yes. 11 Q. -- which states, "Of course, it remains 12 possible that yet unidentified risk factors for 13 ovarian cancer could be important confounders, 14 and several such factors in the aggregate could 15 give risk to an overall association as weak as 16 the one between talc and ovarian cancer." 17 You did not cite that; correct? 18 A. Yeah. And -- but that is already 19 expressed. The same factor is also expressed in 20 the first sentence. Confounding is one potential 21 explanation for -- so, you know, again, if I had 22 placed that sentence, you would say that, well, 23 you're taking three lines, four. 24 So I cite that confounding is one potential 25 explanation.</p>	<p style="text-align: right;">Page 252</p> <p>1 MS. PARFITT: No worries. No worries. 2 A. Which line are you in there? 3 Q. Sure. Look at "recall bias." Does the 4 third sentence state, "Recall bias can readily 5 introduce enough bias to produce the modestly 6 sized overall effect, relative risk equal 1.3, 7 that emerges from these studies"? 8 A. That's -- yeah, that's his 9 interpretation. 10 Q. You don't disagree with that, do you? 11 A. Well, I do disagree in the sense that, 12 you know, he's making inference on the magnitude. 13 I'm not disagreeing that there's a potential for 14 recall bias. But, you know, as I've discussed in 15 my report and -- and, again, if you say that, 16 then I should be writing the Rothman paper 17 instead of my report. Right? You would want Ken 18 Rothman to testify. 19 You have to, you know, take -- you know, I 20 understand what he's trying to say. He's saying 21 that recall bias can introduce an element that 22 would produce 1.3. 23 Q. In fact, Rothman and the other authors 24 of this paper conclude that the modest positive 25 association --</p>
<p style="text-align: right;">Page 251</p> <p>1 Q. You don't disagree with that statement. 2 A. Yeah. Yeah. Because that's one, you 3 know, it's stated that, you know, one potential 4 explanation. 5 Q. All right. Look at, if you will, on 6 Page 1 of the Rothman paper, the middle 7 paragraph. Rothman states, "Most of the 8 published studies are interview-based, 9 case-control studies subject to recall bias which 10 can readily give rise to associations of this 11 magnitude." 12 Did I read that correctly? 13 A. Yes. 14 Q. Go to Page 4, third paragraph of the 15 Rothman paper, Exhibit 28. I'm looking at the 16 section under "recall bias," and the third 17 sentence, "Recall bias can easily introduce 18 enough bias to produce the modestly sized overall 19 effect, relative risk equals 1.3, that emerges 20 from these studies." 21 MS. PARFITT: The only correction -- 22 Q. Is that what Rothman wrote? 23 MS. PARFITT: I'm sorry. It does say 24 "can readily." 25 MR. ZELLERS: I'm sorry.</p>	<p style="text-align: right;">Page 253</p> <p>1 A. Yeah. 2 Q. -- seen in epidemiological studies 3 could be explained by recall bias or an 4 unidentified confounding bias; correct? 5 A. Yes. 6 Q. You did not note in your report 7 Rothman's conclusion -- and if you turn to 8 Page 8, his conclusion -- "More important, there 9 is also positive evidence against a causal 10 association. The inverse dose-response trend for 11 both duration of use and frequency of use, a 12 pattern that could not be explained by a causal 13 relation. Based on these considerations, we 14 suggest that the evidence to date does not 15 indicate that talc can be 'reasonably anticipated 16 to be a human carcinogen.'" 17 A. Yes. And this report was prepared on 18 November 8, 2000. That's 20 years ago. And we 19 have many other studies subsequent to that 20 talking about dose-response, several other 21 understandings about biological mechanisms. 22 So if I wanted -- if you want me to just 23 cite to the Rothman paper or -- there are 115, 24 you know, papers. I mean, there are other -- 25 others will have opined that talc doesn't cause</p>

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<p style="text-align: right;">Page 254</p> <p>1 ovarian cancer.</p> <p>2 Q. What methodology did you use to rule</p> <p>3 out the effect of an unidentified confounding</p> <p>4 bias or multiple unidentified confounding biases?</p> <p>5 A. Yeah. So I mean, as the meta-analyses</p> <p>6 have shown, there are no differences between --</p> <p>7 most of the studies show no differences between</p> <p>8 adjusted and unadjusted estimates, suggesting</p> <p>9 that the potential for confounding is minimal.</p> <p>10 There is no way to rule out unmeasured</p> <p>11 confounding. And that's always a possibility.</p> <p>12 It doesn't mean that it exists.</p> <p>13 Q. As we discussed earlier, you did review</p> <p>14 the Gertig 2000 paper and cite it in your report;</p> <p>15 is that right?</p> <p>16 A. Yes.</p> <p>17 Q. On Page 48 of your report, you note</p> <p>18 that Gertig 2000 found a statistically</p> <p>19 significant increased risk for ever talc use for</p> <p>20 serous invasive cancers; correct?</p> <p>21 A. Let me just come to that section.</p> <p>22 Yes.</p> <p>23 Q. Gertig did not control for BMI or for</p> <p>24 cigarette smoking, did it?</p> <p>25 A. And I'm writing age, duration of</p>	<p style="text-align: right;">Page 256</p> <p>1 cigarette smoking and BMI.</p> <p>2 Q. That it did control for that?</p> <p>3 A. Yeah.</p> <p>4 Q. All right. Show me where, in Gertig</p> <p>5 2000, that they state that they did control for</p> <p>6 BMI and for cigarette smoking.</p> <p>7 A. "For age-adjusted analysis, we</p> <p>8 categorized values as oral contraceptive use,</p> <p>9 tubal ligation, post-menopausal, cigarette</p> <p>10 smoking and BMI."</p> <p>11 Q. What page?</p> <p>12 A. That's two -- whatever that page is,</p> <p>13 250. Yeah. That's my understanding.</p> <p>14 If you look at Table 1, they do have, you</p> <p>15 know, cigarette smoking and whatnot. That's my</p> <p>16 understanding.</p> <p>17 Q. Ter Riet 2013, you cite that in your</p> <p>18 report; is that right?</p> <p>19 A. It is.</p> <p>20 Q. Terry 2013 did not adjust for a hormone</p> <p>21 replacement therapy usage; correct?</p> <p>22 MS. PARFITT: Here is Ter Riet.</p> <p>23 A. Just let me go back to my report. This</p> <p>24 is the Ter Riet meta-analysis?</p> <p>25 Q. Yes. Ter Riet 2013, meta-analysis.</p>
<p style="text-align: right;">Page 255</p> <p>1 contraceptive use, BMI, smoking status.</p> <p>2 Can I look at the study? Sorry.</p> <p>3 Q. You're not wasting my time, are you?</p> <p>4 A. No. No. Because my writeup says that.</p> <p>5 I may be incorrect. And I just want to make sure</p> <p>6 that my writeup is -- you know, if we need to</p> <p>7 correct it, I need to correct it. I'm sorry.</p> <p>8 MR. TISI: Did you mark it?</p> <p>9 MR. ZELLERS: No.</p> <p>10 THE WITNESS: I'm not wasting it, I'm</p> <p>11 saying that because writeup -- I say that it</p> <p>12 does.</p> <p>13 MS. PARFITT: Just so you know, mine is</p> <p>14 a marked-up copy of it.</p> <p>15 MR. ZELLERS: I'm not going to mark it.</p> <p>16 I'm not going to look at it. I just want the</p> <p>17 doctor to answer the question.</p> <p>18 MS. PARFITT: Sure. Here's a copy of</p> <p>19 Gertig.</p> <p>20 BY MR. ZELLERS:</p> <p>21 Q. And my question is very simply --</p> <p>22 A. Age and smoking.</p> <p>23 Q. -- Gertig -- yes -- did not -- well,</p> <p>24 BMI --</p> <p>25 A. Yeah. It says it conducted for</p>	<p style="text-align: right;">Page 257</p> <p>1 A. Okay.</p> <p>2 Q. The question is: Did Ter Riet 2013</p> <p>3 adjust for hormone replacement therapy usage?</p> <p>4 A. Ter Riet.</p> <p>5 MS. PARFITT: Here is a copy.</p> <p>6 A. Mine doesn't say that. Usually,</p> <p>7 Table 1 should answer that question.</p> <p>8 HRT, right? I don't have that data, and I</p> <p>9 haven't included it in my report.</p> <p>10 Q. If hormone replacement therapy is a</p> <p>11 risk factor for ovarian cancer, and assuming that</p> <p>12 Ter Riet did not account for that, that is a</p> <p>13 potential confounding factor; correct?</p> <p>14 A. Again, I have a slight difference in</p> <p>15 your and my definition of confounding, that you</p> <p>16 would have to obviously know if there is an</p> <p>17 association with talc exposure for it to be</p> <p>18 considered a confounder in that specific study.</p> <p>19 Q. All right. You cannot say whether the</p> <p>20 odds ratio of Ter Riet 2013 in that study would</p> <p>21 have been lower if the authors had adjusted for</p> <p>22 hormone replacement therapy usage; correct?</p> <p>23 MS. PARFITT: Objection.</p> <p>24 A. Or higher. I mean, we cannot say one</p> <p>25 way or the other.</p>

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<p>1 Q. Recall bias, it's a concern in every 2 retrospective study; is that right? 3 A. Yeah, it is a potential concern in 4 design of studies where, you know, you're asking 5 about past exposure. 6 Q. Recall bias can distort a scientific 7 evaluation of whether an exposure is actually 8 related to a disease; correct? 9 A. Yes. 10 Q. For example, recall bias could distort 11 results if women with ovarian cancer were more 12 likely to remember their exposure to talc than 13 women without ovarian cancer; correct? 14 A. Yes. I mean, but the extent here is 15 quite minimal, because we don't see it with a -- 16 you know, for daily use, you know, the likely 17 magnitude is small. We've talked about that. 18 You know, if recall bias was operational, we 19 would see it with nongenital talc use. They 20 would be reporting that. And we would be seeing 21 it with other types of, you know, cancer beyond, 22 you know, ovarian. 23 So, yes, recall bias is a potential, but the 24 likely magnitude is small. 25 Q. On Page 54, Paragraph 6 of your</p>	<p>1 talc exposure as part of larger questionnaires on 2 other risk factors, minimizing the possibility of 3 recall bias." 4 Did you write that? 5 A. Yes. 6 Q. How does asking about other risk 7 factors minimize recall bias as to a particular 8 risk factor? 9 A. Yeah. Because, you know, you're not 10 stimulating them to answer -- you know, if you're 11 asking them ten questions about, say -- so it's 12 like, well, were you -- you know, were you 13 active, were you using oral contraceptives, were 14 you -- so if you are -- let me finish. Let me 15 finish my explanation. 16 You're introducing the question of talc use 17 within ten different questionnaires, then you 18 minimize the possibility of recall bias for that 19 particular product versus you're asking talc 20 alone. 21 Q. On what literature are you relying to 22 say that asking about other risk factors 23 minimizes recall bias as to another risk factor? 24 A. I mean, that's just my general 25 understanding of epidemiology. And maybe, you</p>
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<p>1 report -- do you have Page 54, Paragraph 6? 2 A. Yeah. Just to clarify on the question, 3 I disagree with Rothman. So just because it's in 4 Rothman's study, doesn't mean that it's, you know 5 -- 6 Q. I have a new question. Are you ready? 7 A. No. I mean, I have to finish my last 8 question. 9 Q. I didn't ask you a question. 10 A. Okay. Because we are still on the 11 topic of recall bias. 12 Q. I asked the question. 13 A. Okay. 14 Q. Recall bias could distort results of 15 women with ovarian cancer were more likely to 16 remember their exposure to talc than women 17 without ovarian cancer; correct? 18 A. Yes. 19 Q. The next question is: Can you turn to 20 Page 54, Paragraph 6 of your report? 21 A. Okay. 22 Q. You state, "case-control studies are 23 susceptible to recall bias, particularly when 24 data on exposure are self-reported. However, 25 several studies have included these questions on</p>	<p>1 know -- yeah, it's not -- I don't know if it's 2 specific to talc usage. Just a general 3 understanding of epidemiology, about, you know -- 4 yeah, recall bias. 5 Q. Are you done? 6 A. Yeah. 7 Q. All right. Let's look at the effects 8 of recall bias in a study on talcum powder use in 9 ovarian cancer. 10 Are you familiar with the Schildkraut 2016 11 study? 12 A. Yes. 13 Q. That was one of the studies that you 14 relied on in forming your opinions; is that 15 right? 16 A. Yes. 17 MR. ZELLERS: Let's mark that study as 18 Deposition Exhibit 29. 19 (Article entitled "Association 20 between Body Powder Use and Ovarian Cancer: 21 The African American Cancer Epidemiology 22 Study (AACES) marked Exhibit 29.) 23 MS. PARFITT: Got it. Thanks. 24 BY MR. ZELLERS: 25 Q. This is a study titled "Association</p>

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<p style="text-align: right;">Page 262</p> <p>1 Between Body Powder Use and Ovarian Cancer; The 2 African American Cancer Epidemiology Study"; 3 correct? 4 A. Yes. 5 Q. The study looked at, among other 6 things, what impact, if any, lawsuit filings in 7 2014 had on whether women recalled using talc in 8 the past; correct? 9 A. Yeah. It examined the issue of 10 stimulated reporting. And I note it in my 11 report. I don't -- I don't discount that in my 12 discussion of the Schildkraut study. 13 Q. We'll call it Schildkraut. Can we do 14 that? 15 A. Whatever. I don't know. 16 Q. The authors in that study, Exhibit 29, 17 thought that the publicity from lawsuits might 18 influence the participants' recall of prior body 19 powder use; is that right? 20 MS. PARFITT: Objection. 21 A. Yes. And I noted on Page 45 of my 22 report that although there was some evidence that 23 there was more reporting after class action 24 lawsuits in 2014, recall bias alone is 25 insufficient because there is a statistically</p>	<p style="text-align: right;">Page 264</p> <p>1 that they used talc on their genitals was 2 34 percent; is that right? 3 A. Where is that? Yeah. 4 Q. The percentage of cases, meaning women 5 with ovarian cancer, that said that they used 6 talc on their genitals was 36.5 percent; is that 7 right? 8 A. I'm just looking at this. Give me a 9 second. 10 36 -- interview data after 2004? 11 Q. No. My question here is: For women 12 who were interviewed before 2014 -- 13 A. Mm-hmm. 14 Q. -- the control, so women without 15 ovarian cancer, they stated they used talc on 16 their genitals, 34 percent; is that right? 17 A. Yes. 18 Q. For that same time period, women 19 interviewed before 2014 -- 20 A. Mm-hmm. 21 Q. -- with ovarian cancer that said that 22 they used talc on their genitals was 23 36.5 percent. 24 A. Yes. 25 Q. Is that right?</p>
<p style="text-align: right;">Page 263</p> <p>1 significant risk both before and after 2014. But 2 the authors did, you know, think it was an 3 important thing to look at. 4 Q. The authors looked at this and tried to 5 study this; is that right? 6 A. Yes. 7 Q. All right. Go to Page 4, Table 2 of 8 the Schildkraut paper. Tell me when you have it. 9 A. I do. 10 Q. This is a table, Adjusted Odds Ratios 11 for the Associations Between Mode, Frequency and 12 Duration of Body Powder Use and Ovarian Cancer; 13 is that right? 14 A. Yes. 15 Q. The second column shows the number of 16 cases. That's women with ovarian cancer; 17 correct? 18 A. Yes. 19 Q. The third column shows the controls. 20 That's the women who do not have ovarian cancer; 21 correct? 22 A. Yes. 23 Q. Looking at the data, before 2014, 24 before the lawsuits, the percentage of controls, 25 meaning women without ovarian cancer, who said</p>	<p style="text-align: right;">Page 265</p> <p>1 So roughly the same reporting of genital 2 talc use between women with and without ovarian 3 cancer occurred before the lawsuits were filed in 4 2014. 5 MS. PARFITT: Objection. 6 Q. Correct? 7 A. I don't know the timing of lawsuits, 8 but yes, 2014. 9 Q. So then let's look at what happened 10 after the lawsuits were filed. 11 After 2014, what percentage of women without 12 ovarian cancer said that they used talc on their 13 genitals? 14 A. The case -- are you talking about cases 15 or controls? 16 Q. Yeah. I'm talking about controls. 17 A. 34.4, 34.4. 18 Q. So based on this data, the lawsuits had 19 essentially no effect on how many of the women 20 without ovarian cancer, the controls, remembered 21 or recalled using baby powder; correct? 22 A. Yes. 23 Q. It was 34 percent before 2014 and 24 34.4 percent after; is that right? 25 A. Yes.</p>

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<p style="text-align: right;">Page 266</p> <p>1 Q. For women with ovarian cancer, before 2 the lawsuits were filed, 36.5 percent of them 3 said they recalled using baby powder; correct? 4 A. Yes. 5 Q. But after the lawsuits were filed, the 6 percent of women with ovarian cancer who said 7 they used baby powder went up to 51.5 percent; is 8 that right? 9 A. Yes. 10 Q. So after the lawsuits were filed, the 11 percent of women with ovarian cancer who said 12 they used baby powder jumped by over 40 percent; 13 is that right? 14 MS. PARFITT: Objection. Form. 15 A. By 40 percent? Where is 40? 16 Q. A difference between the 36. -- 17 A. 10 percent. It's 51 and 34. Right? 18 Q. It jumped -- I don't have a calculator. 19 A. You're subtracting 51 to 36 or 51 to 20 34? 21 Q. Well, there was -- 22 A. Sorry. 23 Q. That's okay. It's late. 24 There was a significant increase -- 25 A. There was an increase.</p>	<p style="text-align: right;">Page 268</p> <p>1 action lawsuits in 2014, recall bias alone is 2 insufficient to explain these findings, because 3 there was a statistically significant increased 4 risk both before and after 2014." 5 Is that what you state? 6 A. Yeah. 7 Q. Let's look at what the study actually 8 shows. So go to -- 9 A. Yeah. I correct it. Should be there 10 was an excess risk, because there was no 11 statistically significant. 12 Q. Your report is in error; is that right? 13 MS. PARFITT: Objection. 14 A. Well, it should be corrected to an 15 excess risk. 16 Q. It is not, and there is not a 17 statistically significant risk; is that right? 18 MS. PARFITT: Objection. Form. 19 A. Yeah. The test for effect modification 20 by year of interview was technique, but the 21 particular estimate for above -- for, you know, 22 for before 2014 was not significant. 23 Q. Exactly. So pre-2014, there was an 24 odds ratio of 1.19 with a confidence interval 25 ranging from .87 to 1.63; is that right?</p>
<p style="text-align: right;">Page 267</p> <p>1 Q. -- from 36.5 percent before the 2 lawsuits were filed to 51.5 percent after; is 3 that right? 4 A. Yes. 5 Q. So, suddenly, women who had ovarian 6 cancer started reporting a higher incidence of 7 talc use than women had reported before 2014; is 8 that right? 9 MS. PARFITT: Objection. Form. 10 A. Yes. There was -- there was 11 incidence -- you know, evidence of stimulated 12 reporting. But that is just one element of 13 recall bias. That's not completely what is being 14 addressed in my statement on recall bias. This 15 is evidence about stimulated reporting, which is 16 one -- one spectrum of recall bias. 17 Q. It's at least an example of the 18 potential effect of recall bias; correct? 19 A. Yes. 20 Q. All right. Go to Page 45 of your 21 report, the last sentence. 22 A. Yes. 23 Q. "Although" -- and I'm quoting you. 24 "Although there was some evidence that there was 25 more reporting of genital powder use after class</p>	<p style="text-align: right;">Page 269</p> <p>1 A. Yeah. Yeah. 2 Q. That is not statistically significant; 3 is that right? 4 A. Yes. 5 Q. In the absence of statistical 6 significance, that can be indicative of no risk 7 existing; correct? 8 MS. PARFITT: Objection. Form. 9 A. Yeah. But, you know, I'm opining on 10 the study as a whole. That's just one element of 11 stimulated reporting in that study, you know. 12 Yeah. So there's an excess risk, which is in the 13 same direction, but not statistically 14 significant. 15 Q. If the study had ended before 2014, it 16 would have found no statistically significant 17 relationship between talcum powder and ovarian 18 cancer; is that right? 19 A. I'm not seeing the study. I have to 20 interpret the whole study; right? 21 Q. Well, based upon this data that we just 22 looked at -- 23 A. Yeah. 24 Q. -- had the study ended before 2014, 25 there was not a statistically significant</p>

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<p>1 relationship between talcum powder use and</p> <p>2 ovarian cancer; correct?</p> <p>3 MS. PARFITT: Objection. Misstates the</p> <p>4 data.</p> <p>5 A. Yeah. There was an excess risk which</p> <p>6 was not statistically significant. But, you</p> <p>7 know, we are picking and choosing analysis by</p> <p>8 2004. Again, we talked about we are choosing by</p> <p>9 duration. You can pick any one of these analyses</p> <p>10 to cite it. You have to look at the cumulative</p> <p>11 evidence and the cumulative evidence from</p> <p>12 meta-analyses.</p> <p>13 Q. How did you account for this recall</p> <p>14 bias in weighing the Schildkraut study?</p> <p>15 MS. PARFITT: Object to the form.</p> <p>16 A. So, again, I did not weigh one</p> <p>17 individual study. My weight of evidence is based</p> <p>18 on the meta-analysis and the cumulative evidence</p> <p>19 from meta-analysis, the biological studies,</p> <p>20 animal studies, human studies.</p> <p>21 So, you know, I point out the limitations of</p> <p>22 the individual studies, as do the authors of the</p> <p>23 meta-analyses.</p> <p>24 Q. Are your opinions in this matter</p> <p>25 dependent on talcum powder containing asbestos?</p>	<p>1 reports for that.</p> <p>2 Q. You have no personal expertise with</p> <p>3 that; correct?</p> <p>4 A. No.</p> <p>5 Q. Did you consider any testing that found</p> <p>6 no asbestos?</p> <p>7 A. Yeah. I did. I think I'm citing the</p> <p>8 FDA report in my assessment that there are</p> <p>9 studies that suggest the -- I don't know if it's</p> <p>10 an FDA report. It's an FDA study that talks</p> <p>11 about it.</p> <p>12 Q. If your assumption about contamination</p> <p>13 of talcum powder products with asbestos were not</p> <p>14 true, would your opinions in this case change?</p> <p>15 MS. PARFITT: Objection. Form.</p> <p>16 A. Well, again, you know, this is a weight</p> <p>17 of evidence that, does it, you know, contain</p> <p>18 talcum powder -- I mean -- does talcum powder</p> <p>19 product contain asbestos? Or, you know, these</p> <p>20 other metals we've talked about.</p> <p>21 But my opinion was, in fact, arrived at</p> <p>22 before even I was aware of both of the deposition</p> <p>23 testimony, as well as the results of testing by</p> <p>24 Dr. Luongo that my causal opinion was that they</p> <p>25 caused, you know, ovarian cancer.</p>
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<p>1 A. No. I arrived at my causal opinion</p> <p>2 independent of, you know, presence of asbestos</p> <p>3 or, you know, or my understanding of the</p> <p>4 constituents. But I asked to better understand</p> <p>5 what are the constituents of, you know, talcum</p> <p>6 powder products.</p> <p>7 And I was, you know, some of the documents</p> <p>8 and some of the literature even suggests and</p> <p>9 shows that, and some of the testing and some of</p> <p>10 the deposition testimony that I have been privy</p> <p>11 to, suggests the presence of asbestos in talcum</p> <p>12 powder product.</p> <p>13 Q. Do you believe that talcum powder that</p> <p>14 does not contain asbestos causes ovarian cancer?</p> <p>15 A. Yes.</p> <p>16 Q. Is it fair to say that you have not</p> <p>17 made any independent determination as to whether</p> <p>18 or not the talcum powder products manufactured by</p> <p>19 J&J Consumer Products are contaminated with</p> <p>20 asbestos?</p> <p>21 A. Yes. I have not made a determination.</p> <p>22 I've looked at the literature. I have looked at</p> <p>23 the testimony of the experts that was provided,</p> <p>24 and I've looked at testimony -- sorry -- the</p> <p>25 report of Dr. Luongo and I have relied on their</p>	<p>1 MR. ZELLERS: Move to strike as</p> <p>2 nonresponsive. I'm going to ask the question</p> <p>3 again.</p> <p>4 THE WITNESS: Sure.</p> <p>5 BY MR. ZELLERS:</p> <p>6 Q. If your assumption about contamination</p> <p>7 of talcum powder products with asbestos were not</p> <p>8 true, would your opinions in this case change?</p> <p>9 A. No.</p> <p>10 Q. In support of your opinion that talcum</p> <p>11 powder products contain asbestos, you cite to</p> <p>12 exhibits from the depositions of John Hopkins and</p> <p>13 Julie Pier; is that right?</p> <p>14 A. Yes.</p> <p>15 Q. Are you aware that those exhibits were</p> <p>16 created by plaintiff attorneys?</p> <p>17 MS. PARFITT: Objection. Misstates the</p> <p>18 evidence.</p> <p>19 A. Yeah. I mean, I asked them whatever</p> <p>20 that -- you know, these are -- as I understand</p> <p>21 them, they are, you know -- they are created as a</p> <p>22 part of the testimony of these deponents on</p> <p>23 behalf of, you know, the defendants. That's my</p> <p>24 understanding.</p> <p>25 Q. Were you told that the exhibits</p>

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<p>1 Exhibit 28 to the deposition of John Hopkins and 2 Exhibit 47 to the deposition of Julie Pier were 3 exhibits that were created by plaintiffs' 4 attorneys? 5 MS. PARFITT: Objection. Completely 6 misstates the evidence in this case. 7 A. You know. I asked for constituents. I 8 don't know what -- who created what. So I mean, 9 I'm not going to be able to answer that type of 10 question, who created this. 11 I was asked for, you know, what are the 12 constituents, that can I learn more about this? 13 Q. Outside of your work in litigation, do 14 you normally rely on documents created by 15 advocates in order to evaluate epidemiological 16 data? 17 MS. PARFITT: Objection. Again, 18 misstates the evidence as to origin of the 19 Hopkins and Pier Exhibits 28 and 40. 20 You may answer. 21 A. Yeah. I mean, I do. As I said 22 earlier, I rely on our published data. And as 23 the Health Canada approach states, that we rely 24 on whatever evidence becomes available, and, A, 25 is relevant to the particular testimony.</p>	<p>1 than from communicating with plaintiffs' counsel? 2 A. I'm not sure what -- so -- 3 MS. PARFITT: I'm going to object to 4 the form. 5 Q. Sure. The source of data? 6 A. Like source of -- 7 Q. I'm asking you if you know where the 8 data in those exhibits came from. 9 A. So I'll try to answer to the best of my 10 ability. 11 My understanding is that the data on J&J and 12 Imerys were from mines tested over the years, 13 ranging, you know, from several decades. And 14 that contained or -- you know, were contaminated 15 with asbestos, various fibers that were created. 16 And the second was the Luongo report was 17 products that were purchased and that were tested 18 in the laboratory. So that's where the source. 19 I mean, I assume these other two sources. 20 Q. Have you made any effort to investigate 21 the alternative explanations for the data in 22 those charts, Exhibit 28 and Exhibit 47? 23 A. I mean -- 24 MS. PARFITT: Objection. 25 A. So, for example, I think that those</p>
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<p>1 And, importantly, just as my causal opinion 2 was arrived at independent of the constitution of 3 asbestos in talc, Health Canada also is unaware 4 of the presence of -- or at least, you know, they 5 haven't assessed the presence of asbestos in 6 talc, and they are, you know, both congruent. 7 Q. Your testimony is that outside of your 8 work in litigation, that you normally do rely on 9 data and documents created by plaintiffs' 10 counsel? 11 MS. PARFITT: Objection. Form. Asked 12 and answered. And misstates the evidence. 13 A. So I, you know, rely on evidence that's 14 available in terms of epidemiologic evidence. 15 And my testimony on asbestos was based on testing 16 and based on -- testing by -- based on some of, 17 you know, there are studies which suggest the 18 presence of asbestos. 19 Q. Do you know where the data in 20 Exhibit 28 to Hopkins and Exhibit 47 to Pier came 21 from? 22 A. You know, I was seeing these were in 23 various mines conducted. That's my 24 understanding. 25 Q. Do you have an understanding, other</p>	<p>1 data are, as I said earlier, my causal opinion 2 is -- is, you know, this is only a -- my causal 3 opinion is only -- you know, this is only a small 4 link in my causal opinion between talc and 5 ovarian cancer, and it's not predicated on the 6 presence of asbestos. 7 I don't have the expertise to determine 8 whether asbestos is present. 9 Q. I'm trying to make it a simple 10 question. I'm just trying to find out what you 11 did and what you did not do. 12 Did you make any effort to investigate the 13 alternative explanations for the data in the 14 charts which are marked as Exhibit 28 and 15 Exhibit 47? 16 A. So -- 17 MS. PARFITT: Objection. 18 A. What is 28, 47? 19 MS. PARFITT: Yeah. Let's get them. 20 Do you have a copy of them here to show -- 21 MR. ZELLERS: No. 22 MS. PARFITT: You aren't going to show 23 it to him? 24 MR. ZELLERS: He cites to these in his 25 report.</p>

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<p style="text-align: right;">Page 278</p> <p>1 MS. PARFITT: Then let's get them. 2 We'll get them. Give him a moment. 3 MR. ZELLERS: We don't need to get them 4 to answer this question. 5 MS. PARFITT: Do you need them, 6 Dr. Singh? 7 THE WITNESS: Yes. 8 MS. PARFITT: Do you want to take a 9 quick break? 10 MR. ZELLERS: And I object. And this 11 should not be time that gets charged me. 12 BY MR. ZELLERS: 13 Q. My question simply is: Did he attempt 14 to investigate any alternative causes. He can 15 either say yes, he can say no, or he can say I 16 don't recall. 17 A. Yes. 18 Q. All right. What did you do to 19 investigate alternative explanations? 20 A. I mean, you know, I was looking at 21 the -- I was already looking at the published 22 literature, but beyond that, I was looking at 23 what are the alternate -- again, as I said, you 24 know, my expertise in determining -- I'm not a 25 mineralist that I can, you know, that I can</p>	<p style="text-align: right;">Page 280</p> <p>1 knowledge on these issues; correct? 2 A. Yeah. I mean, for my purpose, you 3 know, it was more an understanding of the 4 constituents, whether that would provide, you 5 know, proof against biologic plausibility, proof 6 for biologic plausibility. 7 So, for example, you say, did I undertake 8 attempts to understand the constituents? Yes. I 9 mean, I was looking for, well, are there some 10 antioxidants that, if you had some antioxidants 11 in that product, and I'm not aware of, or anti, 12 you know, carcinogens and maybe these scientists 13 will be able to provide that. 14 Q. Did you ask counsel for plaintiffs for 15 any information or testimony from either J&J 16 company folks or Imerys scientists as to what the 17 tests actually showed with respect to asbestos? 18 MS. PARFITT: Other than Exhibits 28 19 and 47? 20 A. I assume those testifying were J&J 21 scientists and Imerys, and they were speaking 22 about those tests. 23 Q. My question is: Did you ask for any 24 additional information? 25 A. No. I mean, I asked -- as I said, I</p>
<p style="text-align: right;">Page 279</p> <p>1 determine that. And, again, I'm not opining that 2 Dr. Luongo's report -- I mean, he will have to 3 vouch for his report. 4 Q. Let me ask it a different way. 5 A. Yeah. 6 Q. If scientists from the J&J companies 7 and Imerys scientists say that those tests don't 8 actually show asbestos, it was just tremolite 9 reported, for example, you have no expertise to 10 dispute that; correct? 11 MS. PARFITT: Objection. Misstates the 12 evidence in this case, entirely. 13 Do you want to ask him a hypothetical? 14 Q. It's a hypothetical question. 15 MS. PARFITT: It's a hypothetical. 16 A. Again, with my limited expertise and my 17 understanding of whatever I was provided and 18 cited there, my understanding was that there was 19 asbestos present in there and, you know, other 20 people can have different opinions and I think 21 mineralogists, geologists will -- 22 Q. Those are the -- 23 A. Yeah. 24 Q. -- expertise or the -- those are the 25 types of experts that would have substantive</p>	<p style="text-align: right;">Page 281</p> <p>1 asked about the causal question and I got what I 2 got. We can go about it in various ways. 3 Like did I ask again? No, I didn't. And I 4 don't want any more documents. 5 Q. We'll try to shortcut this. 6 Do you believe Luongo? You reviewed his 7 testimony; right? 8 MS. PARFITT: Objection. Form. 9 Go ahead. 10 A. Yeah. It's like how do you believe, 11 you know -- again, it's an area of expertise. He 12 tests, you know, these products, you know, this 13 is not my area of experience. At least based on 14 his testing, there is presence of asbestos in 15 my -- and provides additional support. 16 Q. Did you look at any of the experts for 17 the defendants who have opined to the opposite 18 statement or the opposite? 19 MS. PARFITT: I think -- objection. 20 A. I was told that the expert defendants 21 hadn't even been -- you know, haven't submitted 22 reports or haven't been, you know, opined on. 23 That's sort of my understanding. 24 Q. You believed and accepted the Luongo 25 testing for purposes of this case; is that right?</p>

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<p>1 MS. PARFITT: Objection. Misstates the 2 heart of his testimony. 3 A. So, first of all, this report is 70 4 whatever pages. Luongo is maybe a paragraph or 5 two. So, yes, I believe that was one study. 6 For the purposes of, you know, identifying, 7 you know, I identified his. I identified what 8 was shown and what was in those notes. And I 9 identified some epidemiologic -- I mean, some 10 findings in the published literature. 11 I mean, that's as much as I could know about 12 it. I mean, you had Routers' study, you know, 13 talking about it in the media. So there's lots 14 of different things. 15 I didn't go and, you know, go looking into 16 the Routers report. Maybe that's what I should 17 be looking at. 18 Q. You did not confirm that any of the 19 talc samples mentioned in those charts were 20 actually from talc that was used in baby powder; 21 correct? 22 MS. PARFITT: Objection. Misstates the 23 evidence that was available to him. If you want 24 to show him the charts, you can do it. 25 Q. Can you answer that question?</p>	<p>1 I'm not trying to slow you down. 2 MR. TISI: And you said you think he 3 was. 4 MR. ZELLERS: Yes. And it was in jest, 5 Counsel. We all chuckled and we all laughed. 6 MR. TISI: As long as it was in jest, 7 that's fine. 8 THE WITNESS: I took it to be in jest. 9 I know I reviewed one, but I'm just 10 trying to see if I reviewed another one. There 11 was -- yeah. 12 So I said, No. 30 and then 31, 32, two 13 additional reports. Sorry. 14 Q. Have you ever met Luongo? 15 A. I don't know him. 16 Q. Do you know his qualifications? 17 A. No. 18 Q. Had you ever heard of him before you 19 got involved in this MDL talc ovarian cancer 20 litigation? 21 A. No. 22 Q. Have you reviewed any Luongo testing 23 where he did not find asbestos? 24 A. These were the three reports I 25 reviewed. So I don't know if he has conducted</p>
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<p>1 MS. PARFITT: Objection. 2 A. I did not confirm it myself. 3 Q. You realize that the vast majority of 4 talc isn't even used for body powder; correct? 5 MS. PARFITT: Objection. Misstates the 6 evidence. 7 A. I realize that -- yeah, I don't know 8 what -- you know, there are various other uses of 9 talc. 10 Q. Do you also rely on -- well, strike 11 that. 12 How many Luongo reports have you reviewed? 13 A. I just have to take a look. I know 14 that I reviewed one. And I'm not trying to slow 15 you down. I'm just trying to be accurate. 16 Q. I think you are, but -- 17 MS. PARFITT: Objection to the 18 characterization, Counsel. 19 A. I'm trying to find this. 20 MS. PARFITT: He's acted in a 21 professional way throughout all this, so it's 22 good. 23 MR. TISI: You asked him questions 24 looking at his report. 25 MR. ZELLERS: The witness said to me,</p>	<p>1 additional testing. 2 Q. Let me ask again. Have you reviewed 3 any Luongo testing where he did not find 4 asbestos? 5 A. I did not review any additional beyond 6 what is cited here. 7 Q. Have you reviewed the FDA's testing of 8 talcum powder products? 9 A. I have cited it. I mean, I have not 10 reviewed the specific test, but I have, you know, 11 cited what -- what they -- what they found. 12 Q. Have you made any effort to quantify 13 the amount of any alleged contaminant in the 14 Johnson & Johnson Consumer Products talcum powder 15 products? 16 A. That's way beyond my expertise. 17 Q. Is any amount safe? 18 MS. PARFITT: Objection. 19 A. Well, as of my understanding that 20 asbestos, you know, any amount of asbestos is not 21 safe, that's my understanding. And, obviously, 22 others can -- 23 Q. Do you defer to other experts on that 24 issue? 25 A. Yeah. But, you know, my understanding</p>

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<p style="text-align: right;">Page 286</p> <p>1 is that any amount -- and I think there's some 2 testimony from others to that effect as well. 3 But I'll defer to others. 4 Q. Do you have an opinion on what type of 5 asbestos is in the baby powder products? 6 A. Again, you know, this whole -- you 7 know, this sort of questions around constituents 8 of the product, for me, it was more trying to 9 understand whether it's asbestos or any other 10 constituents in the product, provide evidence in 11 support or against. 12 I can't tell you what amount would cause or, 13 you know, not cause baby -- in baby powder will 14 cause ovarian cancer. 15 Q. What types of asbestos are associated 16 with ovarian cancer? 17 A. I haven't done a causal analysis of 18 asbestos and ovarian cancer. I know that the 19 IARC has classified asbestos as a carcinogen, 20 Grade 1, and that also stated that it caused 21 ovarian cancer, but -- about asbestos and fibrous 22 talc, but obviously others will provide more -- 23 more specifics. 24 Q. Do you have any -- strike that. 25 Do you have knowledge as to the different</p>	<p style="text-align: right;">Page 288</p> <p>1 at meta-analysis that, you know, cause, as well 2 as the IARC report that, you know, talks about 3 asbestos and fibrous talc as a carcinogen and 4 also cites studies that show that asbestos causes 5 ovarian cancer. But, again, I wasn't doing a 6 formal causal analysis. 7 Q. Do you agree that research on the 8 potential relationship between asbestos and 9 ovarian cancer has only considered a small number 10 of cases? 11 MS. PARFITT: Objection. Form. 12 A. I mean, ovarian cancer is a rare, rare 13 disease. And, you know, it's going to be a small 14 number of cases, regardless of etiology, what 15 they are trying to study. 16 Q. How many of the studies involve 17 occupational exposure? 18 A. I think the predominant -- 19 MS. PARFITT: Objection. 20 A. -- studies have involved occupational 21 exposure. 22 Q. How many were nonoccupational, if any? 23 A. I don't recall the numbers. 24 Q. Did any of the nonoccupational asbestos 25 studies reach statistical significance?</p>
<p style="text-align: right;">Page 287</p> <p>1 types of asbestos? 2 A. No. 3 Q. What dose of asbestos is associated 4 with ovarian cancer? 5 A. I have not evaluated the dose of 6 asbestos with ovarian cancer. 7 Q. What type of ovarian cancer is asbestos 8 associated with? 9 A. I have not -- as I said earlier, I have 10 not evaluated the specific causal link between 11 asbestos and ovarian cancer. My causal question 12 was, does talcum powder products cause ovarian 13 cancer. And whatever the constituents are, you 14 know, whether they provide evidence in support or 15 against. And, as you said, there may be 16 additional testing. 17 Q. Does the type of ovarian cancer vary 18 based upon the type of asbestos? 19 A. Again, I didn't evaluate that -- that 20 body of evidence. 21 Q. Did you evaluate studies that have 22 explored the potential link between asbestos and 23 ovarian cancer? 24 A. Yeah. I mean, I didn't, again, 25 evaluate the causal link between that. I looked</p>	<p style="text-align: right;">Page 289</p> <p>1 MS. PARFITT: Objection. Form. 2 A. Again, I would have to look at the 3 study that you're talking about. And I just -- I 4 can't recall it off the top of my head. 5 Q. Can you tell how many women were 6 studied? 7 A. No, I can't. I mean, you can't ask 8 questions about these things, and tell me how 9 many women. No. You have to show me the study 10 if you want to go down that line of questioning. 11 Q. I'll show you a study. 12 A. Sure. 13 Q. Are you familiar with the Reid study 14 published May 24th of 2011? 15 A. Yes. 16 Q. It's one of the studies you looked at; 17 is that right? 18 A. Yes. 19 MR. ZELLERS: We'll mark that as 20 Exhibit 30. 21 (Article entitled "Does Exposure 22 to Asbestos Cause Ovarian Cancer? A 23 Systematic Literature Review and 24 Meta-analysis" marked Exhibit 30.) 25 MS. PARFITT: Thank you.</p>

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<p>1 THE WITNESS: Can you repeat the</p> <p>2 question for me?</p> <p>3 MR. ZELLERS: Sure.</p> <p>4 THE WITNESS: I'm sorry.</p> <p>5 BY MR. ZELLERS:</p> <p>6 Q. Go to the first page, the right column.</p> <p>7 A. Mm-hmm.</p> <p>8 Q. Reid. And this article is entitled</p> <p>9 "Does Exposure to Asbestos Cause Ovarian Cancer?"</p> <p>10 Is that right?</p> <p>11 A. Yes.</p> <p>12 Q. The authors state, on the first page,</p> <p>13 on the right-hand side, right above the No. 1 and</p> <p>14 No. 2, "Studies that have examined this issue</p> <p>15 have been limited for two major reasons. No. 1,</p> <p>16 small number of cases"; is that right?</p> <p>17 A. Yes.</p> <p>18 Q. The authors state, "Much fewer women</p> <p>19 than men have been exposed to asbestos,</p> <p>20 particularly in more heavily exposed occupational</p> <p>21 settings where relative risks are higher."</p> <p>22 You agree with that; correct?</p> <p>23 A. Yes.</p> <p>24 Q. Then the second major limitation deals</p> <p>25 with difficulties of diagnosis; is that right?</p>	<p>1 Where are you pointing to?</p> <p>2 MR. ZELLERS: Sure. I'm looking at</p> <p>3 the --</p> <p>4 MS. PARFITT: Thank you.</p> <p>5 MR. ZELLERS: -- No. 2.</p> <p>6 MS. PARFITT: Uh-huh.</p> <p>7 MR. ZELLERS: The last full sentence.</p> <p>8 MS. PARFITT: Thank you. I appreciate</p> <p>9 it.</p> <p>10 MR. ZELLERS: On Page -- first page of</p> <p>11 the article.</p> <p>12 MS. PARFITT: Thank you. I appreciate</p> <p>13 that.</p> <p>14 MR. ZELLERS: Sure.</p> <p>15 A. Yes.</p> <p>16 Q. Have the studies addressed confounding</p> <p>17 and independent risk factors?</p> <p>18 A. Well, again, you know, my examination</p> <p>19 of asbestos -- I mean, I was not trying to</p> <p>20 establish a causal link between asbestos and</p> <p>21 ovarian cancer, you know, when in trying to look</p> <p>22 at talcum powder products and ovarian cancer, you</p> <p>23 know, one of the questions was constituents.</p> <p>24 And, you know, the IARC agrees that, or at</p> <p>25 least opines that it is, causally, is a</p>
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<p>1 A. Yes.</p> <p>2 Q. Are you aware of the difficulties that</p> <p>3 have existed over time in distinguishing between</p> <p>4 peritoneal mesothelioma and ovarian cancer?</p> <p>5 A. Yes. As a general idea of -- you know,</p> <p>6 because they share histologic similarities.</p> <p>7 Q. Did those difficulties affect the</p> <p>8 reliability of the studies?</p> <p>9 A. Yes, but if you look at Table 2 of that</p> <p>10 report, you see that, despite if you look at</p> <p>11 studies that review the ovarian pathology, you</p> <p>12 still see a statistically significant increased</p> <p>13 risk of incidence of mortality from ovarian</p> <p>14 cancer. So, yes, overall studies, it's a higher</p> <p>15 estimate, but even if you take into account</p> <p>16 mesothelioma diagnoses and misclassification, you</p> <p>17 still cannot, you know, account that -- we still</p> <p>18 are left with that asbestos causes, you know,</p> <p>19 ovarian cancer.</p> <p>20 Q. The authors of the Reid paper that you</p> <p>21 reviewed and relied on, Exhibit 30, stated, "It</p> <p>22 has been particularly difficult to distinguish</p> <p>23 between peritoneal mesothelioma and ovarian</p> <p>24 serous carcinoma"; is that right?</p> <p>25 MS. PARFITT: Counsel, I'm sorry.</p>	<p>1 carcinogen and lists that and lists the Kamargo</p> <p>2 study as, you know, that asbestos causes ovarian</p> <p>3 cancer.</p> <p>4 Q. Well, the Camargo 2011 study</p> <p>5 acknowledges an inability to account for</p> <p>6 nonoccupational risk factors for ovarian cancer</p> <p>7 other than age; correct?</p> <p>8 A. Again, if I can --</p> <p>9 Q. Take a look. Sure.</p> <p>10 A. These statements -- it's getting to the</p> <p>11 end of the day, so...</p> <p>12 MR. ZELLERS: Deposition Exhibit 31.</p> <p>13 (Article entitled "Occupational</p> <p>14 Exposure to Asbestos and Ovarian Cancer: A</p> <p>15 Meta-analysis" marked Exhibit 31.)</p> <p>16 BY MR. ZELLERS:</p> <p>17 Q. Deposition Exhibit 31 is the Kamargo</p> <p>18 paper; is that right?</p> <p>19 A. Yes.</p> <p>20 Q. This is another paper that you have</p> <p>21 reviewed?</p> <p>22 A. Yes.</p> <p>23 Q. On the first page, the overview --</p> <p>24 A. Yes.</p> <p>25 Q. -- it states, "Objective: A recent</p>

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<p style="text-align: right;">Page 294</p> <p>1 monograph working group of IARC conducted" -- or 2 strike that -- "concluded that there is 3 sufficient evidence for a causal association 4 between exposure to asbestos and ovarian cancer. 5 We performed a meta-analysis to quantitatively 6 evaluate this association." 7 Is that right? 8 A. Yes. 9 Q. If you look at Page 1216, middle 10 column -- are you there? 11 So I'm looking at the second full paragraph 12 above "conclusion." 13 "A further limitation of our analysis was 14 its inability to account for nonoccupational risk 15 factors for ovarian cancer other than age." 16 Do you see that? 17 A. And what do you mean by that? I mean, 18 I didn't -- again, you know, I -- 19 Q. Let me just ask. Is that a 20 limitation -- 21 A. Yeah. 22 Q. -- on the analysis? 23 A. It is a limitation. 24 Q. Hasn't failure to account for 25 misclassification and known risk factors been</p>	<p style="text-align: right;">Page 296</p> <p>1 Q. And you're not making a causal 2 assessment or determination -- 3 A. No. 4 Q. -- on asbestos; is that right? 5 A. Yes. 6 Q. Okay. Under "discussion," Page 1215 -- 7 A. And I'm going to take a break after 8 that whenever you're done. I'm sorry. I need to 9 use the restroom. 10 Q. That's okay. That's fine. That's 11 fine. 12 Do you see under "discussion," this is on 13 the left-hand column, second full paragraph, 14 where they're talking about Edelman? 15 A. Yes. 16 Q. And the authors state, "They concluded, 17 however, that despite the positive and 18 significant association, there was insufficient 19 information to infer that ovarian cancers were 20 caused by occupational exposure to asbestos 21 because of concerns about tumor 22 misclassification, inappropriate comparison 23 populations and the failure to take into account 24 for known risk factors." 25 Is that --</p>
<p style="text-align: right;">Page 295</p> <p>1 cited as a reason why causality cannot be 2 established? 3 MS. PARFITT: Objection. 4 A. We can't rely on IARC. As you said, 5 one said that it is possibly associated and here, 6 when they haven't arrived at a -- I mean, 7 causality is just not about association in one. 8 I mean, they have to look at other biological 9 mechanisms of asbestos and ovarian cancer, you 10 know, what happens in the lab, what happens -- I 11 haven't done that evaluation. 12 So, yes, this is a limitation. But this 13 needs to be taken into account with, you know, 14 the entire body of evidence on asbestos and 15 ovarian cancer. 16 Q. You're looking at and relying on 17 papers, including Reid, Exhibit 30? 18 A. The IARC monographs. 19 Q. And Kamargo, Exhibit 31; is that right? 20 A. Yes. And, again, I'm clarifying that 21 I'm not making a causal determination on IARC, 22 you know. I'm just relying on that, you know, 23 that I'm not -- first of all, I didn't set out to 24 make a causal determination on asbestos and 25 ovarian cancer.</p>	<p style="text-align: right;">Page 297</p> <p>1 A. Again -- 2 Q. You don't disagree with that, do you? 3 A. Yeah. I mean, I don't -- but I don't 4 disagree -- I mean, I'm relying on the IARC 5 assessment and others that, you know, there's a 6 causal association between exposure. Again, I 7 did not review. I would have gotten and reviewed 8 evidence, Edelman and White and others, if I had 9 to do it over again. 10 MR. ZELLERS: Let's take a break. 11 We'll come back and I'll finish up. Thank you. 12 THE VIDEOGRAPHER: Off the record, 13 3:32 p.m. 14 (A recess was taken.) 15 THE VIDEOGRAPHER: Here begins Media 16 No. 5 in today's deposition of Sonal Singh, MD, 17 M.P.H. Back on the record, 3:43 p.m. 18 BY MR. ZELLERS: 19 Q. Dr. Singh, do you agree that exposure 20 to asbestos through perineal cosmetic talc use, 21 assuming the talc contains asbestos fibers, is 22 different than the heavy occupational exposure 23 that's primarily been researched? 24 MS. PARFITT: Objection to form. 25 A. Again, you know, I've not professed to</p>

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<p style="text-align: right;">Page 298</p> <p>1 be an expert in different kinds and routes of 2 asbestos exposure. My -- my sort of -- at least 3 my understanding of my causal question was 4 exposure to talcum powder products and ovarian 5 cancer and whether the constituents can provide 6 evidence in support or refute that association. 7 So, you know, whether asbestos exposure, 8 what different kinds, others will opine on that. 9 Q. Do you know what a cleavage fragment 10 is? 11 A. No. And we can go on on this kind of 12 stuff, and I'll say no. 13 Q. Do you know how it differs from an 14 asbestos fiber? 15 A. No. And I'm not a mineralogist. 16 Q. If I ask you a whole line of questions 17 about different types of asbestos, you're going 18 to defer to other folks? 19 A. Yes. 20 Q. Is there any epidemiology 21 substantiating the theory that fragrance 22 ingredients can cause ovarian cancer? 23 A. I'm not aware of such studies. 24 Q. Is there any epidemiology 25 substantiating the theory that exposure to trace</p>	<p style="text-align: right;">Page 300</p> <p>1 may do testing and provide antioxidants and 2 substances which reduce the risk. So that will 3 have to be weighed. 4 But I am not providing that causal link 5 between the individual constituent and ovarian 6 cancer. 7 Q. And that would be true for any of the 8 individual fragrance chemicals and heavy metals 9 that may be present in the baby powder; correct? 10 MS. PARFITT: Objection. 11 A. I don't have that area of expertise on 12 individual constituents in products. 13 MR. ZELLERS: I have no further 14 questions. Thank you. 15 THE WITNESS: Thank you for your time. 16 (Discussion off the record.) 17 THE WITNESS: Thank you. 18 MR. ZELLERS: Thank you, Doctor. 19 MR. KLATT: Give me a minute to get 20 organized here, Doctor. 21 THE WITNESS: Sure. 22 MR. KLATT: Are we off the record? 23 THE VIDEOGRAPHER: No. 24 MR. LOCKE: Let's go off the record, 25 then.</p>
<p style="text-align: right;">Page 299</p> <p>1 amounts of the heavy metals at issue can cause 2 ovarian cancer? 3 A. I'm not aware of -- you know, again, I 4 didn't do the evaluation, trace the specific 5 constituents of ovarian cancer. I just was 6 trying to understand the constituents, what are 7 they. I just, you know, whether trace -- trace 8 elements cause inflammation and -- you know, but 9 I am not aware of studies that link them directly 10 to ovarian cancer. 11 Q. You're not opining in this case that 12 the fragrance chemicals and heavy metals that may 13 be present in baby powder are causally associated 14 with ovarian cancer. 15 MS. PARFITT: Objection. 16 Q. Correct? 17 MS. PARFITT: Form. 18 A. Yes. I'm not -- again, I'm not opining 19 on the individual constituents of talcum powder 20 products. My opinion is, you know, I look at the 21 exposure and the exposure is talcum powder 22 products, and the presence of constituents, some 23 of which are identified as, you know, Grade 1 24 carcinogens, others as Grade 2, provide evidence 25 in support, and others may -- you know, others</p>	<p style="text-align: right;">Page 301</p> <p>1 THE VIDEOGRAPHER: Off the record, 2 3:47 p.m. 3 (A recess was taken.) 4 THE VIDEOGRAPHER: Back on the record, 5 3:51 p.m. 6 CROSS-EXAMINATION 7 BY MR. KLATT: 8 Q. Good afternoon, Dr. Singh. My name is 9 Mike Klatt, and I represent Imerys Talc America 10 in this case. 11 Have you ever heard of Imerys Talc America 12 before you got involved in this case? 13 A. I have, but, you know, I don't know in 14 what context and what, you know. 15 Q. Do you know what Imerys Talc America 16 does? 17 A. I don't know all the details of the 18 activities or, you know, Imerys. 19 Q. As you know, Mr. Zellers has covered a 20 fair amount of ground already. And so I'm going 21 to skip around just to ask you some follow-up 22 questions. 23 You said earlier today, when you were 24 talking to Mr. Zellers, that you potentially 25 intended to write up something about talc and</p>

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<p>1 ovarian cancer?</p> <p>2 A. Sure.</p> <p>3 Q. And I just wanted to get a better</p> <p>4 understanding of what you were referring to.</p> <p>5 A. Yeah. So after, sort of -- and I'm not</p> <p>6 going to do it until this is all over, because I</p> <p>7 feel that there, you know, I have access to</p> <p>8 documents that are -- that are sort of protected</p> <p>9 by court order.</p> <p>10 But partly what I'm thinking of is -- like</p> <p>11 there have been so many systematic reviews and</p> <p>12 meta-analyses that I was thinking more on the</p> <p>13 kind of like an umbrella review of all these</p> <p>14 reviews that I cite in my report and with, you</p> <p>15 know, some of the rating of reviews.</p> <p>16 And then -- and that's sort of my thinking,</p> <p>17 was that what I would do is synthesize the</p> <p>18 evidence, that -- what I do best is synthesize</p> <p>19 the evidence from other studies in trying to --</p> <p>20 you know, so it would be separate from, like,</p> <p>21 because he asked the question, would you do a</p> <p>22 systematic review? You know, meta-analysis. No.</p> <p>23 Because there have been so many already.</p> <p>24 Q. Have you undertaken that project yet or</p> <p>25 is this just something you're thinking of?</p>	<p>1 subject; correct?</p> <p>2 MS. PARFITT: Objection. Form.</p> <p>3 A. I mean, depending -- I don't know the</p> <p>4 specifics on arrangement, but the question is,</p> <p>5 you know, as long as the disclosure is</p> <p>6 transparent, and as long as, you know, the</p> <p>7 funding mechanisms, what was the reasons, yeah.</p> <p>8 So it's not like they have commissioned this</p> <p>9 review.</p> <p>10 I mean, first of all, I have just thought</p> <p>11 about it. I haven't even done it. I'm not sure</p> <p>12 I'll do it with my time. But you would have to</p> <p>13 disclose that, yeah.</p> <p>14 Q. But my question, and, again, I think</p> <p>15 we'll go quicker if we just focus on the question</p> <p>16 asked and the answer to that question.</p> <p>17 But my question is: It's entirely</p> <p>18 appropriate for companies to contact and retain</p> <p>19 outside experts to advise them and then to</p> <p>20 publish articles in the literature.</p> <p>21 You've done it yourself; correct?</p> <p>22 MS. PARFITT: Objection. Form.</p> <p>23 You may answer.</p> <p>24 A. Yeah. I have actually been, you know,</p> <p>25 I have worked with Eli Lilly on systematic</p>
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<p>1 A. Yeah. I'm thinking about --</p> <p>2 Q. I'm sorry. Let me finish.</p> <p>3 This is something you're just thinking about</p> <p>4 doing in the future?</p> <p>5 A. In the future. But I have</p> <p>6 conceptualized, if I were to do that, that's what</p> <p>7 I would do.</p> <p>8 Q. And if you do do that, you would be</p> <p>9 obliged, would you not, to disclose to whatever</p> <p>10 entity, body, journal, that you submitted this</p> <p>11 work to, that you had been a retained, paid</p> <p>12 expert by plaintiffs in the talc ovarian cancer</p> <p>13 litigation; correct?</p> <p>14 A. Yeah. And that's been my standard</p> <p>15 practice. If you go back and look at my papers,</p> <p>16 you know, my papers on SGLT2 inhibitors, I've</p> <p>17 disclosed that I was funded by, you know,</p> <p>18 Janssen. You know, a paper on statins that I</p> <p>19 wrote last year, I was a paid expert.</p> <p>20 So it's just standard practice for us to do</p> <p>21 that.</p> <p>22 Q. And now that you bring that up, there's</p> <p>23 absolutely nothing wrong with a company like</p> <p>24 Janssen or any other company hiring an outside</p> <p>25 expert to advise them and to publish on a certain</p>	<p>1 reviews of diabetes medications.</p> <p>2 And -- to a point of clarification, I was</p> <p>3 not paid by them, but I was an expert on that,</p> <p>4 which is sort of a strange arrangement; right?</p> <p>5 You don't get paid, but you're still working for.</p> <p>6 But, you know, that's my area of expertise. So,</p> <p>7 yeah, companies hire and that's how science</p> <p>8 works.</p> <p>9 Q. And, for example, if you contacted your</p> <p>10 institution, the University of Massachusetts</p> <p>11 Medical Center, about this ovarian cancer risk</p> <p>12 factors web pages that they have, and you had any</p> <p>13 input on that, you would disclose that you're a</p> <p>14 paid plaintiffs' expert in talc ovarian cancer</p> <p>15 litigation; correct?</p> <p>16 A. Well, so to do that, I don't know where</p> <p>17 that web page came from. I didn't contact them.</p> <p>18 Yes, but, you know, I'm not trying. So I don't</p> <p>19 know if you're thinking about like the up-to-date</p> <p>20 example. I didn't want to change. I was just</p> <p>21 providing them references.</p> <p>22 But, yes, if I was trying to make changes to</p> <p>23 a document that that's on, you know, I'm trying</p> <p>24 to write something up, then if you look at my</p> <p>25 letter, it's just a contact point. If I'm trying</p>

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<p style="text-align: right;">Page 306</p> <p>1 to write something up and say, you know what, it 2 increases the risk of cancer, decreases, then, 3 yes, I'd disclose that. 4 Q. And just to go over that point -- 5 A. Yeah. 6 Q. -- when you wrote the editor about Up 7 To Date, suggesting that they update their 8 website regarding talc and ovarian cancer, you 9 did not disclose that, at that time, you were a 10 paid retained plaintiffs' expert; is that 11 correct? 12 A. Yes. But I asked them to clarify that 13 this was just to update the references, if you 14 look at them. 15 Q. Now, going back to what this 16 conceptualizing you're having of potentially one 17 day publishing something about talc and ovarian 18 cancer, okay, that's what I'm asking about. 19 Are we on the same page? 20 A. Yeah. 21 Q. Wait. I just want you to know what I'm 22 asking about. Okay? 23 A. Okay. 24 Q. Now, you would agree with me, you 25 mentioned this morning there were confidentiality</p>	<p style="text-align: right;">Page 308</p> <p>1 on time and other considerations. 2 Q. And, again, focusing my question very 3 specifically, the case-control studies on talc 4 and ovarian cancer, the cohort studies on talc 5 and ovarian cancer, the meta-analysis on talc and 6 ovarian cancer that you've reviewed in this case 7 and that you've cited in your expert report in 8 this case, none of those are bound by a 9 protective order that would prevent you from 10 reading them, analyzing or publishing on them; 11 correct? 12 A. None of them are restrictive. 13 Everybody has access. I had, too. 14 Q. Okay. You talked briefly about the 15 Centers for Disease Control this morning. 16 A. Yes. 17 Q. Have you ever worked with them? 18 A. No. I've applied for grants with them, 19 and I wasn't funded, but I'm aware of them. 20 Yeah. 21 Q. Have you ever conducted a 22 population-based, case-control study yourself? 23 A. Yes. 24 Q. As principal investigator? 25 A. Yes.</p>
<p style="text-align: right;">Page 307</p> <p>1 orders in place. But you'd admit that all of the 2 case-control epidemiology and all the cohort 3 epidemiology and all the meta-analysis that 4 you've reviewed are all out there in the 5 published literature; correct? 6 A. The majority of them, studies are, 7 yeah. I mean, Taher is not out in the 8 literature. It's still in somewhere. 9 Q. There's no -- there's no meta-analysis 10 cohort study or case-control study you're aware 11 of that is controlled or -- by some sort of 12 protective order that would limit you citing it 13 in some sort of review; correct? 14 MS. PARFITT: Objection. Form. 15 A. So, first of all, yeah. As you know, 16 Taher is sort of not published. So I don't know 17 how much of the data you can use. 18 But in terms of protective, I don't know all 19 the rules about what you can use and not use. 20 So, I mean, it's just more my unfamiliarity with 21 the process, but nothing -- if you're asking the 22 question, is something preventing me from doing 23 that? No. 24 Q. Okay. 25 A. Can I go ahead and do it? It depends</p>	<p style="text-align: right;">Page 309</p> <p>1 Q. Have you done so for cohort studies? 2 A. No. Not a cohort study. 3 Q. Could we go to Langseth, whatever 4 exhibit number that is? 5 MR. TISI: I've got it. It's 6 Exhibit 21. I've got a copy of it here. 7 MS. PARFITT: Yeah. I know. 8 MR. TISI: Do you mind me giving our 9 copy? 10 MR. KLATT: No. Not at all. 11 BY MR. KLATT: 12 Q. I just have a few more questions. You 13 were already asked about Langseth, but I just 14 have a few more questions for you. 15 At the time the Langseth study was 16 published, you would agree with me, Doctor -- 17 MS. PARFITT: I'm sorry, Mike. I 18 didn't hear your question. I'm sorry. 19 Q. Yeah. Let me start over. 20 MS. PARFITT: I appreciate that. 21 Q. I'm talking about the Langseth paper 22 that we've marked as Exhibit 21; is that correct? 23 It was published in 2008 by the IARC working 24 group members; correct? 25 A. Yes. Some of the members. I suspect</p>

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<p style="text-align: right;">Page 310</p> <p>1 the group is much larger than these folks. 2 Q. Well, these happened to be 3 epidemiologists on the IARC working group; 4 correct? 5 A. I don't know all their qualifications. 6 Q. Do you know any of those people 7 personally who are listed as authors on 8 Exhibit 21? 9 A. No. 10 Q. I'll represent to you that they're 11 epidemiologists. You would agree with me, that 12 if you turn over to Page 2, they listed 14 13 population-based, case-control studies up at the 14 top, and then they had six more hospital-based, 15 case-control studies; correct? 16 A. Yes. 17 Q. At this time, there was one cohort 18 study all on the subject of talc and ovarian 19 cancer at the time; correct? 20 A. Yes. 21 Q. You would admit that the 22 population-based, case-control studies did not, 23 consistently across the board, show a 24 statistically significant increased risk 25 according to the table in Exhibit 21, the</p>	<p style="text-align: right;">Page 312</p> <p>1 it, in and of itself, was not statistically 2 significant; correct? 3 MS. PARFITT: Object to the form. 4 A. Yes. But it was consistent with the 5 overall estimates. 6 Q. And the cohort study didn't show an 7 increased risk. And the two cohort studies since 8 Langseth have not shown an increased risk of 9 ovarian cancer in talc users; correct? 10 MS. PARFITT: Objection. Misstates the 11 evidence. 12 A. I see that, A, two of the cohort 13 studies have showed an excess risk, which is not 14 statistically significant. One study has showed 15 statistically significant increased risk, and the 16 third studies have showed, you know, risk 17 estimates lower than one, but their upper bounds 18 are entirely consistent with what we see here and 19 subsequent to this. 20 Q. So the population-based, case-control 21 studies collectively show an increased risk. But 22 they're inconsistent; correct? 23 A. No. 24 MS. PARFITT: Objection. 25 A. I mean, let's go to Penninkilampi. I</p>
<p style="text-align: right;">Page 311</p> <p>1 Langseth paper. Some were statistically 2 significant, and others were not; correct? 3 A. Yeah. But I mean, I don't view 4 statistical significance as -- 5 Q. Doctor -- 6 A. -- areas of consistency. 7 Q. Doctor, I just asked whether they were 8 statistically significant. 9 A. No. All of them were not statistically 10 significant. 11 Q. And we're talking about the 14 12 population-based, case-control studies in the 13 Langseth paper as of 2008; correct? 14 A. Yes. But I view them as consistent. 15 Q. And the hospital-based, case-control 16 studies that are on Page 2 of the Langseth paper, 17 the six -- the hospital-based, case-control 18 studies, none of them were statistically 19 significant; correct? 20 A. Yes. But I still view them as 21 consistent with the overall findings. 22 Q. And, in fact, when they did a 23 meta-analysis of the hospital-based, case-control 24 studies, that meta-analysis that added all 25 hospital-based, case-control studies together,</p>	<p style="text-align: right;">Page 313</p> <p>1 mean, they clearly opine that -- 2 Q. I'm asking you about Langseth. 3 A. Why are we looking at 2008 when we are 4 in 2019? 5 Q. Because I'm asking the questions. 6 A. Okay. 7 Q. You would agree with me that, of the 8 three study designs, cohort studies, 9 hospital-based, case-control studies and 10 population-based, case-control studies, only one 11 of those three study designs shows an overall 12 increased risk of ovarian cancer in talc users; 13 correct? 14 MS. PARFITT: Objection. Misstates the 15 evidence. 16 A. No. I mean, at least at that time, you 17 had one, you know, cohort study. I believe that 18 all of them show an excess risk, which is 19 consistent. Two of those study designs that 20 you're talking about, the hospital based and the 21 cohort, did not show a statistically significant, 22 which I still believe a significant excess that's 23 consistent. 24 Q. And you said earlier that you consider 25 and use the Bradford Hill considerations;</p>

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<p>1 correct?</p> <p>2 A. Sorry. Just give me a second.</p> <p>3 Yeah. The Bradford Hill overviews as one.</p> <p>4 Q. And you know, Sir Bradford Hill himself</p> <p>5 said that, in evaluating consistency, you have to</p> <p>6 look at consistency across different study</p> <p>7 designs; correct?</p> <p>8 A. Yeah. And times and places and other</p> <p>9 things.</p> <p>10 Q. But I'm correct that Dr. Bradford or</p> <p>11 Sir Bradford Hill said that you have to look at</p> <p>12 consistency across different study designs;</p> <p>13 correct?</p> <p>14 A. That's what I state in my testimony, as</p> <p>15 well in my report cites that specific phrase,</p> <p>16 consistency across study designs, times and</p> <p>17 places. So I am not -- you know, I am, in fact,</p> <p>18 quoting him when I cite that.</p> <p>19 Q. You said, on Page 15 of your report,</p> <p>20 that, "Talc-based body powders are used</p> <p>21 habitually for months or years rather than just a</p> <p>22 single application"; correct?</p> <p>23 A. Where is that?</p> <p>24 MS. PARFITT: Page 15.</p> <p>25 Q. Page 15.</p>	<p>1 things you had reviewed was an Exhibit 47 to</p> <p>2 Imerys employee Julie Pier's deposition.</p> <p>3 Do you recall that?</p> <p>4 A. Yes. If you can show me that.</p> <p>5 MR. KLATT: Sure.</p> <p>6 THE WITNESS: Thank you.</p> <p>7 MR. KLATT: I'm sorry. I'm sorry.</p> <p>8 THE WITNESS: Exhibit --</p> <p>9 MR. KLATT: Yeah. Let's mark it as the</p> <p>10 next exhibit. And that would be 33; is that</p> <p>11 correct?</p> <p>12 MS. PARFITT: 32.</p> <p>13 COURT REPORTER: Here is 32 that you</p> <p>14 haven't used.</p> <p>15 MR. KLATT: Let me do this. Yes. That</p> <p>16 will be 32.</p> <p>17 (Chart marked Exhibit 32.)</p> <p>18 MR. TISI: The chart?</p> <p>19 MR. KLATT: Yes.</p> <p>20 BY MR. KLATT:</p> <p>21 Q. I'm going to show you what's been</p> <p>22 marked as Exhibit 32 to this deposition. But for</p> <p>23 future record references, it also has, in the</p> <p>24 upper right-hand corner, a photocopy, Exhibit</p> <p>25 No. 47; correct?</p>
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<p>1 A. Where is that? I'm sorry. Which part</p> <p>2 of it? 15. I know I have 15. Is it the last</p> <p>3 paragraph or --</p> <p>4 MS. PARFITT: Yeah.</p> <p>5 A. I don't see -- okay. Yeah.</p> <p>6 Q. And what did counsel just point out to</p> <p>7 you?</p> <p>8 A. Yeah. I saw that. That's correct.</p> <p>9 Q. And can you read what you said there?</p> <p>10 A. "Talcum powder products are used</p> <p>11 habitually for months or years rather than a</p> <p>12 single application or single body."</p> <p>13 Q. Would you flip over to Page 54 of your</p> <p>14 report, please. In Paragraph 6 there, you say,</p> <p>15 in the third sentence that, "Recall bias is less</p> <p>16 likely to occur for chronic daily exposures such</p> <p>17 as talc"; correct?</p> <p>18 A. That's, you know, that's my</p> <p>19 understanding.</p> <p>20 Q. Talc, in your estimation, is a chronic</p> <p>21 daily exposure; correct?</p> <p>22 A. That's how -- that's my understanding</p> <p>23 that, you know, women are using it.</p> <p>24 Q. You, in response to Mr. Zellers'</p> <p>25 questions earlier today, said that one of the</p>	<p>1 A. Yeah.</p> <p>2 Q. Exhibit 47 was the exhibit number at</p> <p>3 Ms. Pier's deposition, and Exhibit 32 is the</p> <p>4 exhibit number we're marking this today; correct?</p> <p>5 A. Okay.</p> <p>6 Q. Would you agree with me that you don't</p> <p>7 have the expertise or knowledge to tell me that</p> <p>8 any of the samples on Exhibit 32 to today's</p> <p>9 deposition show asbestos in Imerys talc that</p> <p>10 ended up in Johnson & Johnson's baby powder, do</p> <p>11 you?</p> <p>12 MS. PARFITT: Objection.</p> <p>13 A. I mean, it says, you know,</p> <p>14 anthophyllite -- yeah. I mean, I don't have</p> <p>15 asbestos expertise here.</p> <p>16 Q. Let's -- you understand that most of</p> <p>17 these samples, the source of these samples isn't</p> <p>18 even identified?</p> <p>19 MS. PARFITT: Objection. Form.</p> <p>20 A. Yeah. But -- but, actually, can I</p> <p>21 answer that?</p> <p>22 So, for example, separate from the source, I</p> <p>23 mean, I understand that it says chrysotile</p> <p>24 asbestos for the first one. It says serpentine.</p> <p>25 It says chrysotile.</p>

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<p style="text-align: right;">Page 318</p> <p>1 Q. And where on that first one, and we're 2 looking at the very first line across the top of 3 Exhibit 32 -- 4 A. Sure. 5 Q. -- where in the world does it say that 6 that was a sample of talc that ended up in 7 Johnson & Johnson's talc-based body powder 8 products? 9 A. Well, my understanding, and I can share 10 that, that this was -- this was that -- that 11 testimony was given that this was a testing of 12 mines that was being mined by Imerys or -- I 13 mean, that contained asbestos. 14 Whether it ended up in baby powder was not 15 the question. The question was: Does talc 16 contain asbestos? 17 Q. Did plaintiffs' counsel ask you to make 18 that assumption? 19 A. No. No. 20 Q. Okay. Well, then, I'm confused, 21 because Imerys and its predecessors have tested 22 literally thousands of samples of talc from 23 competitors, from their own mines, from mines 24 that are never used for cosmetic purposes or baby 25 powder, so how can you tell me that the first</p>	<p style="text-align: right;">Page 320</p> <p>1 on your report where I think you refer to it. 2 A. I know it's in the biologic 3 plausibility section somewhere. 4 Q. Look on page -- I believe it's Page 61 5 of your report. 6 A. Yes. 7 Q. No. I'm sorry. It's Page 59 of your 8 report. And it's the third paragraph down. 9 A. Mm-hmm. 10 Q. And you say, in the middle of the third 11 paragraph, "In studies of human mesothelial 12 cells, both nonfibrous talc and asbestos have 13 shown evidence of genotoxicity," and the 14 reference is 109, and my understanding is 15 reference 109 is the Shukla paper published in 16 2009; correct? 17 A. Where are you referring? I'm sorry. 18 In Page 59? 19 Q. Page 59 of your report, third 20 paragraph. 21 A. Yeah. 22 Q. Second sentence. 23 A. Yeah. It says here, should be Shukla. 24 Yeah. 25 Q. Did you read the Shukla paper?</p>
<p style="text-align: right;">Page 319</p> <p>1 sample on Exhibit 32 has anything to do with baby 2 powder? 3 A. Well, I'm not telling you anything to 4 do with baby powder. My question is that, you 5 know -- that what constitutes talcum powder 6 products. And based on this and, you know, talc 7 is mined together with all these other particles, 8 I wanted to know, what are the results. 9 And at least based on my understanding of 10 these results, again, I'm not a mineralogist, 11 they can argue whether the amount of asbestos is 12 significant or, you know, these fibers, chromium, 13 cobalt, nickel are significant. My understanding 14 is that these particles are present. 15 Q. Can you tell me, based on your own 16 knowledge or expertise, that any sample listed on 17 Exhibit 32 was from talc that ended up in 18 Johnson & Johnson's baby powder or Shower to 19 Shower talcum powder products? 20 A. No. I cannot. 21 Q. Okay. You referred in your report to 22 the Shukla paper; correct? 23 Do you recall that? 24 A. Show it to me. It's been a while. 25 Q. Sure. I'm going to give you the page</p>	<p style="text-align: right;">Page 321</p> <p>1 A. I read -- you know, I didn't read it 2 line by line. But, yes, I read it. 3 Q. You know the Shukla paper has nothing 4 to do with genotoxicity; correct? 5 A. I mean, we can look at it. 6 Q. Sure. It's about gene expression; 7 correct? 8 MS. PARFITT: Let's take a moment, 9 Mr. Klatt, see if he can look at the study here. 10 Q. Do you have it handy, Doctor? 11 A. No. I don't. 12 MS. PARFITT: What is he referencing, 13 109? 14 A. Shukla. I mean, it might be in my 15 files. 16 Q. Well, I apologize. I thought I brought 17 an extra copy, but I don't think I have one with 18 me. 19 (Discussion off the record.) 20 Q. Well, just look at the title. The 21 title is "Alterations in Gene Expression in Human 22 Mesothelial Cells Correlates with Neural 23 Pathogenicity." Correct? 24 A. Yes. I remember that title and 25 abstract. Yes.</p>

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<p style="text-align: right;">Page 322</p> <p>1 Q. Gene expression is something that 2 occurs in our bodies every day; correct? 3 Trillions of times every day; correct? 4 A. Yeah. Yeah. 5 Q. And changes in gene expression, in and 6 of themselves, don't establish genotoxicity; 7 correct? 8 A. Yeah. And I'm not -- again, this, you 9 know, in the section on biologic plausibility, 10 I'm not making this argument that talc is an 11 established mutagen and, you know, whether it's a 12 genotoxic or nongenotoxic carcinogen. I'm just 13 citing the studies. 14 So, I mean, again, I don't have that 15 expertise, and, you know, does it provide 16 evidence for or against biological plausibility 17 mechanisms. 18 Q. Okay. But you don't have the expertise 19 to judge that; correct? 20 MS. PARFITT: Objection. 21 A. No. I have expertise to judge whether 22 these studies suggest evidence of, you know, 23 changes and we should probably just look at it -- 24 give me a second. 25 Q. Sure.</p>	<p style="text-align: right;">Page 324</p> <p>1 common in these lawsuits, wasn't associated with 2 pelvic inflammatory disease; correct? 3 A. Again, I don't remember the papers. 4 Sorry. 5 Q. All right. Well, it's on Page 58 of 6 your report and it's reference 122. 7 A. Which page of my report? 8 Q. Page 58 of your report that cites 9 reference 122. 10 MS. PARFITT: Here's the article. 11 Q. Do you see the reference? 12 A. Yeah. Yeah. 13 Q. Do you see the reference in your 14 report? 15 A. Sure. 16 Q. And reference 122 is to the Rasmussin 17 paper from 2017 on pelvic inflammatory disease 18 and ovarian cancer; correct? 19 A. Yeah. And my citation is correct. I 20 mean, about borderline ovarian. I don't misquote 21 the study. 22 Q. I didn't say you misquoted it, but the 23 study does stand for the proposition that the 24 most common form of ovarian cancer, both in the 25 U.S. and in these lawsuits, high-grade serous</p>
<p style="text-align: right;">Page 323</p> <p>1 MS. PARFITT: Give me a second. 2 Q. My specific question is you cited 3 Shukla for evidence of genotoxicity, but it says 4 nothing whatsoever about genotoxicity, does it? 5 A. We have to look at the paper before we 6 say that. 7 It's 109. Yeah. Let me look in my binder. 8 I think I have all the studies. 9 Q. Doctor, I'll represent to you, in the 10 interest of time, I've searched the Shukla paper, 11 and the word "genotoxicity" or "mutagenicity" is 12 never mentioned in the paper. 13 A. I -- I don't want to deny that. It may 14 be. I just feel that I wouldn't have used that 15 term had I not seen it there. 16 Q. In the interest of time, rather than 17 wasting time, let's move on. 18 You'd agree with me that pelvic inflammatory 19 disease is chronic inflammation of the ovaries, 20 fallopian tubes and peritoneum; correct? 21 A. Yes. 22 Q. And, yet, you cited the Rasmussin 23 paper, and the Rasmussin paper says that 24 high-grade serous ovarian cancer, which is the 25 most common form of ovarian cancer and the most</p>	<p style="text-align: right;">Page 325</p> <p>1 ovarian cancer is not associated with pelvic 2 inflammatory disease; correct? 3 A. Where does it show that? I didn't -- 4 Q. Can you go to the "Discussion" section. 5 A. Again, you know, my view of 6 inflammation was, you know, I was looking for 7 evidence for or against. And, you know, I wasn't 8 disaggregating by ovarian cancer subtype, but I'm 9 happy to look at it. 10 MS. PARFITT: Mark, do you have a page 11 in the article? 12 MR. KLATT: I don't know if we have the 13 same pagination, but my page is -- 14 MS. PARFITT: Here. I got it. It's 29 15 of 33. 16 MR. KLATT: I believe that's right. 17 MS. PARFITT: Okay. 18 MR. KLATT: It's the "Discussion" 19 section. 20 MS. PARFITT: Yes. 21 BY MR. KLATT: 22 Q. And if you look at the "Discussion" 23 section, Doctor -- 24 A. Yes. 25 Q. -- it starts -- the very first</p>

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<p style="text-align: right;">Page 326</p> <p>1 paragraph starts with "to our knowledge"; 2 correct? 3 A. Yeah. 4 Q. Okay. Go down one, two, three, to the 5 fourth paragraph starting with "in the present 6 study"? 7 A. Sure. 8 Q. And in that paragraph, tell me if I 9 correctly quote this sentence. 10 "Conversely, no convincing associations 11 between PID," which is pelvic inflammatory 12 disease, "and the risk of high-grade serous, 13 mucinous, clear cell or endometrioid ovarian 14 cancer were noted in the main analysis." 15 Did I read that correctly? 16 A. Yes. 17 Q. And then if you go down to the very 18 next paragraph that begins with "nevertheless." 19 A. Yeah. I see that, but I -- 20 Q. Wait. Wait. 21 A. No. No. I need to answer your 22 question. 23 Q. I'm just asking you, first of all, if 24 I'm reading this correctly. 25 A. Sure.</p>	<p style="text-align: right;">Page 328</p> <p>1 Q. So the paper you cited, the 2017 2 Rasmussen paper on pelvic inflammatory disease 3 and ovarian cancer is inconsistent with the 4 theory that chronic inflammation causes 5 high-grade serous ovarian cancer; correct? 6 A. Let's go to Paragraph 3. 7 Q. Could you just answer my question? 8 A. Yeah. I'm trying to. 9 MS. PARFITT: Objection. 10 A. No. It isn't inconsistent. 11 Because if you look at Paragraph 3, they 12 state, "Furthermore, we observed similarly 13 increased risks of serous and mucinous borderline 14 tumors associated with PID status. Furthermore," 15 and they also state, "Sensitivity analysis 16 revealed statistically significant increased risk 17 of low-grade serous and endometrial when using 18 data from the North American..." 19 So I don't think your -- and concerning the 20 histologic subtypes, indications of risk of 21 low-grade serous cancers were noted in the main 22 analysis. I wasn't disaggregating. But this 23 entirely consistent with what I quote here, that 24 you increase serous type and you increase 25 low-grade type and you increase histologic.</p>
<p style="text-align: right;">Page 327</p> <p>1 Q. In the next paragraph that begins with 2 "nevertheless," do you see what I'm talking 3 about? 4 A. Yeah. 5 Q. There's a sentence that says, 6 midparagraph, "In contrast, no associations 7 between pelvic inflammatory disease and 8 high-grade serous ovarian cancer were observed"; 9 correct? 10 Did I read that correctly? 11 A. Our results suggest -- I'm sorry. 12 Where -- 13 Q. In contrast. Do you see the sentence 14 that says "in contrast"? 15 A. Where was it? Is it in the same 16 paragraph? 17 Q. It's the paragraph starting with 18 "nevertheless, our results." 19 A. Yeah. But it says differentially. 20 Where does it say in contrast? In contrast. 21 Yeah. 22 Q. Okay. Can you read that sentence? 23 A. "In contrast, no associations between 24 PID and high-grade serous ovarian cancers were 25 observed."</p>	<p style="text-align: right;">Page 329</p> <p>1 You are trying to disaggregate this into a 2 high-grade serous. I don't know what's in the 3 lawsuit. I'm really not opining on -- 4 Q. I'm not trying to disaggregate 5 anything, Doctor. I'm saying Rasmussen, the 6 study that you -- 7 A. Yeah. 8 Q. The study that you chose to cite -- 9 A. Sure. 10 Q. -- in your article indicates there's no 11 association between pelvic inflammatory disease 12 that is a chronic disease of the female 13 reproductive tract and high-grade serous ovarian 14 cancer; correct? 15 A. And the same -- 16 MS. PARFITT: Objection is. 17 A. -- study showed an increase risk of -- 18 Q. Is that correct? 19 MS. PARFITT: Let him finish, please. 20 A. -- between PID and serous ovarian 21 cancer. So it sort of is -- is consistent with 22 my hypothesis of inflammation and ovarian cancer. 23 I was not disaggregating histologic 24 subtypes. 25 Q. My question is not about low-grade</p>

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<p style="text-align: right;">Page 330</p> <p>1 serous that doesn't occur very often. My 2 question is about high-grade serous ovarian 3 cancer in the evidence from the Rasmussen paper, 4 and they say clearly twice, that pelvic 5 inflammatory disease is not associated with 6 high-grade serous ovarian cancer; is that 7 correct? 8 A. That's what they state in the study. 9 But they also state clearly that serous ovarian 10 cancer is associated with PID status. So that's 11 also clearly stated. 12 Q. And if, indeed, as they state, there is 13 no association between high-grade serous ovarian 14 cancer and pelvic inflammatory disease, that's 15 inconsistent with the theory that inflammation 16 causes high-grade serous ovarian cancer; correct? 17 MS. PARFITT: Objection. Form. 18 A. So, again, you know, first of all, you 19 know, I -- other people will opine to the 20 biologic sort of arguments about inflammation and 21 ovarian cancer. And I did not disaggregate 22 specific, and I don't think this study is 23 inconsistent with what I state here. And I note 24 that borderline ovarian cancer. 25 So this is entirely consistent with the</p>	<p style="text-align: right;">Page 332</p> <p>1 cancer. So if we disaggregate it, then we have 2 to disaggregate the way they have defined it. 3 Q. And when we disaggregate, you come to 4 the conclusion that inflammation is associated 5 with borderline ovarian cancer. But, in 6 fairness, you have to come to the conclusion that 7 inflammation is not associated with high-grade 8 serous ovarian cancer? 9 MS. PARFITT: Objection. 10 Q. If you're being objective; correct? 11 MS. PARFITT: Objection. Misstates 12 testimony. 13 A. I am being objective. I am providing 14 that they conclude, not I conclude, that, you 15 know, inflammation is PID, you know, it's just 16 one aspect of inflammation. PID is associated 17 with serous ovarian cancer. And, yes, it is not 18 associated with high-grade epithelial ovarian 19 cancer. 20 Q. You talked with Mr. Zellers earlier 21 today about recall bias, correct, and how it can 22 operate in case-control studies? 23 A. I don't recall the details. 24 Q. But you recall the subject was 25 discussed --</p>
<p style="text-align: right;">Page 331</p> <p>1 inflammation hypothesis. And I just, you know -- 2 Q. In your report, you cited what you 3 thought was consistent with the inflammation 4 theory, but you didn't cite the evidence from 5 Rasmussen that was inconsistent with the 6 inflammation theory; correct? 7 MS. PARFITT: Objection. 8 A. No. I was not disaggregating to the 9 level of each histologic subtype. 10 Q. Well, didn't -- in your report, on 11 Page 58 -- 12 A. Yeah. 13 Q. -- didn't you make the specific point 14 that Rasmussen said inflammation was associated 15 with low-grade cancer? 16 A. No. It just said increased risk of 17 borderline ovarian cancer. 18 Q. Okay. Borderline. That's a specific 19 type of ovarian cancer. 20 A. Sure. 21 Q. So you did disaggregate in your report, 22 didn't you? 23 A. Sure. Yeah, but I mean, if you look at 24 the study, and we want to disaggregate it, the 25 study still shows a risk of serous ovarian</p>	<p style="text-align: right;">Page 333</p> <p>1 A. Yes. 2 Q. -- correct? 3 A. Yes. And I'm going to take a break in 4 a minute. 5 Q. Sure. Do you know if, in any of these 6 case-control studies -- well, let me back up. 7 A case-control study takes a group of cases 8 which are women with -- who already have ovarian 9 cancer, and interviews them; correct? 10 A. Yes. 11 Q. And then it takes a group of controls 12 and, in the context of a population-based 13 case-control study, those controls are healthy 14 women out in the community; correct? 15 A. Yeah. In the context of -- yes. 16 Q. Do you know if any of these 17 case-control studies, when they were interviewing 18 the case women who had ovarian cancer, asked them 19 when they entered the study, "Do you have any 20 preconceived notions about what might have caused 21 your ovarian cancer?" 22 A. I didn't review that specific question. 23 Q. Wouldn't that be an important question 24 to ask? Because if a woman already has a 25 preconceived notion from research or word of</p>

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<p>1 mouth what might cause her ovarian cancer, that 2 may bias the results; correct? 3 MS. PARFITT: Objection. 4 A. There's lots of different questions you 5 could ask them. You know, I would have, if I had 6 designed a study, I would have asked many other 7 questions. 8 Q. And would you have asked that one, "Do 9 you have preconceived notions as to what might 10 have caused your ovarian cancer," before you 11 entered the study? 12 A. I don't -- you know, I don't -- I 13 haven't thought about that conceptual or new 14 study. I'm not sure that is that important 15 question to ask. 16 Q. It wouldn't be an important question to 17 ask women entering a study, a case-control 18 study -- 19 A. Sure. 20 Q. -- women who have ovarian cancer, "Do 21 you have a preconceived notion about what caused 22 your ovarian cancer?" 23 A. You know, I've done -- designed 24 case-control studies of etiology cases and 25 outcomes. I've never asked the participants</p>	<p>1 eliminate for the possibility of recall bias. 2 Others may design it differently. 3 THE WITNESS: I'm going to take a 4 break. 5 MR. KLATT: Sure. 6 THE VIDEOGRAPHER: Off the record, 7 4:30 p.m. 8 (A recess was taken.) 9 THE VIDEOGRAPHER: Back on the record. 10 4:36 p.m. 11 BY MR. KLATT: 12 Q. Doctor, are you board certified in 13 epidemiology? 14 A. No. 15 Q. Are you a member of the American 16 College of Epidemiology? 17 A. No. 18 Q. Are you a member of the Society for 19 Epidemiologic Research? 20 A. No. 21 MR. KLATT: All right. I'm going to 22 turn it over to Mr. Locke. Thank you for your 23 time. 24 THE WITNESS: Thank you. 25 THE VIDEOGRAPHER: Off the record,</p>
Page 335	Page 337
<p>1 about what is your preconceived notions about 2 certain outcomes. 3 I mean, I'm just trying to understand, why 4 would you ask that, because -- 5 Q. Because you're trying to eliminate bias 6 from the study; correct? 7 A. Yeah. 8 Q. And if you enter the study with a 9 preconceived notion what caused your ovarian 10 cancer, you already have a bias; correct? 11 MS. PARFITT: Objection. 12 A. But I mean, aren't you introducing bias 13 by asking these questions? "Okay, what is your 14 preconceived notion?" I'm trying to understand 15 this question. I just don't think that -- 16 Q. So it's your testimony that, typically, 17 in these case-control studies, the women who have 18 the disease of interest, in this case, ovarian 19 cancer, are not asked, when they enter the study, 20 if they already have preconceived notions about 21 what caused their ovarian cancer? 22 A. Yeah. In my opinion, if I were to 23 design a next case and control study, I'm not 24 sure that would be a question. I would have to 25 think about why I would ask that question to</p>	<p>1 4:36 p.m. 2 (A recess was taken.) 3 THE VIDEOGRAPHER: Back on the record, 4 4:38 p.m. 5 CROSS-EXAMINATION 6 BY MR. LOCKE: 7 Q. Doctor, my name is Tom Locke. I 8 represent the Personal Care Products Council. 9 Prior to this litigation, had you ever heard 10 of the Personal Care Products Council? 11 A. No. 12 Q. Sometimes it goes by the name of PCPC. 13 Have you ever heard of that? 14 A. No. 15 Q. Previously, the Personal Care Products 16 Council was known as the Cosmetics, Toiletries 17 and Fragrances Association. 18 Prior to this litigation, had you heard of 19 that entity? 20 A. No. 21 Q. And sometimes that's abbreviated, CTFA. 22 Had you heard of that entity? 23 A. No. 24 Q. Have you, prior to this talc 25 multi-district litigation that we're here on</p>

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<p style="text-align: right;">Page 338</p> <p>1 today, have you worked with any of the 2 plaintiffs' lawyers with whom you've had dealings 3 in talc? 4 A. Yeah. I mentioned that I worked with 5 Attorney Restaino in the atorvastatin that is 6 listed on my testimony. 7 Q. Anyone else? 8 A. No. 9 Q. Have you worked with the Beasley Allen 10 firm? 11 A. They're not -- I don't know if they're 12 part of this talc. The name sounds familiar. I 13 just don't know the name of the lawyers. 14 Q. Right. They're part of the lead 15 plaintiffs' counsel in this multi-district 16 litigation. 17 A. But I just have had correspondence with 18 these lawyers. So, you know, I may have had -- 19 received, I don't know, documents or -- I don't 20 know if invoices or something that may have. But 21 I don't -- I haven't, like, corresponded with the 22 lawyers of Beasley Allen. 23 Q. What I'm asking about is whether you 24 had worked with the Beasley Allen firm prior to 25 this talc litigation.</p>	<p style="text-align: right;">Page 340</p> <p>1 A. I remember asking about this specific 2 trial. I have not asked for other trial 3 testimony, I don't think. 4 Q. When you say "this specific trial," 5 what do you mean? 6 A. When I said -- you know, I said, in 7 this litigation, have epidemiology testimony been 8 submitted. And I have asked for it. Yeah. 9 Q. Would it be relevant to you that other 10 scientists have analyzed the very same issues 11 that are encompassed in your report and testified 12 on behalf of defendants in other talc litigation? 13 A. Yeah. And as you see that, I have not 14 even had a chance to review the expert report 15 of -- on behalf of the plaintiffs that were 16 submitted in the list. 17 So, yes, it will be nice to do that. A, how 18 much time; and, B, you know, I think it would 19 probably be more prudent to wait for the 20 epidemiologists on this particular case. 21 But, you know, as you said, I haven't even 22 had the chance to review the plaintiffs' experts. 23 And, you know, I asked for defendants' expert, 24 you know, report. 25 Q. You asked for defendants' expert</p>
<p style="text-align: right;">Page 339</p> <p>1 A. I have listed the -- you know, 2 listed the cases I worked for. I don't remember 3 the name of the counsels and, you know, who were 4 on the firms. So if it ended up that they were 5 involved in Viagra or something else, that's just 6 a recollection issue. 7 Q. Okay. Mr. Klatt asked you about 8 materials authored by defense experts. Let me 9 elaborate on that a little bit. 10 Are you aware that various defense experts 11 authored reports in connection with prior talc 12 litigation? 13 A. No. I'm not aware. 14 Q. Are you aware that there were prior 15 talc trials? 16 A. I mean, I have seen it in the news 17 that -- I don't know if they're in state court, 18 federal court, you know. I see it in the news. 19 Q. Did you -- 20 A. California or something. Yeah. I'm 21 not aware. 22 Q. Did you ask for the testimony of any 23 defense experts who may have testified regarding 24 epidemiology in connection with that other talc 25 litigation trials?</p>	<p style="text-align: right;">Page 341</p> <p>1 reports in this litigation. 2 A. Sure. 3 Q. But you didn't ask for defendants' 4 expert reports, deposition transcripts or trial 5 testimony in the prior talc litigation? 6 A. How do I know? I mean, I'm not very 7 familiar with how these, you know, different 8 trials are occurring, what you can share, which 9 attorneys are involved in which trials. 10 I'm sorry. I didn't ask for it. I know 11 that, but I'm just not familiar with that 12 process, what they can share. 13 Q. Okay. Can you go to Page 10 of your 14 report. And I guess there are two exhibits to 15 it, or it's referred to in two exhibits. 16 Are you looking at Exhibit 10 there? 17 A. Exhibit 10. 18 Q. On the front page. 19 MS. PARFITT: It's your report. Yes. 20 A. Exhibit 10. Yes. 21 Q. So if you could go to Page 10, I'd 22 appreciate that. And on Page 10, you're 23 discussing, among other things, the advantages 24 and disadvantages of cohort and case-control 25 studies; is that correct?</p>

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<p>1 A. Yes.</p> <p>2 Q. Okay. If you would look at the</p> <p>3 paragraph that begins with the phrase</p> <p>4 "case-control studies."</p> <p>5 Do you see that there?</p> <p>6 A. Yeah.</p> <p>7 Q. Okay. You're explaining your opinion</p> <p>8 why case-control studies have some advantages</p> <p>9 over cohort studies in that paragraph; is that</p> <p>10 correct?</p> <p>11 A. No. Not necessarily. I mean, that</p> <p>12 just talks about the strength and weaknesses of</p> <p>13 various studies designs. I mean, in fact, you</p> <p>14 know, it talks about whether, you know, that, in</p> <p>15 fact, it says exposure is ascertained</p> <p>16 retrospectively.</p> <p>17 So I'm just talking about the strength and</p> <p>18 limitations of various designs.</p> <p>19 Q. Okay. I was using advantages and</p> <p>20 disadvantages.</p> <p>21 Is there a significant difference between</p> <p>22 those two?</p> <p>23 A. That's just the term we use. Yeah.</p> <p>24 Q. Okay. Now, one of the strengths, in</p> <p>25 your opinion, of a case-control study, is that it</p>	<p>1 be useful, because you couldn't find all of the</p> <p>2 lung cancer cases.</p> <p>3 A. Yes. And that sort of applies to</p> <p>4 Gonzalez. And it was a six-month study, and some</p> <p>5 of the other cohort studies that were of limited</p> <p>6 duration.</p> <p>7 So, yes, I mean, I don't know about the time</p> <p>8 course exactly of lung cancer risk, but can apply</p> <p>9 to various outcomes.</p> <p>10 Q. Okay. So what is the latency period</p> <p>11 for perineal talc exposure and ovarian cancer?</p> <p>12 A. I do not have -- I don't know, because,</p> <p>13 you know, I don't -- again, I don't elucidate the</p> <p>14 mechanism of ovarian cancer and the precise link.</p> <p>15 So I cannot tell you that X number of days after</p> <p>16 perineal talc or months after. I know that it is</p> <p>17 long-term. It could be months to years. And</p> <p>18 that's as much as I can say.</p> <p>19 Q. So your example, when you were talking</p> <p>20 about 12 months, actually, that really wouldn't</p> <p>21 be a problem or we don't know whether that's a</p> <p>22 problem or not because it could be months?</p> <p>23 A. No.</p> <p>24 MS. PARFITT: Objection.</p> <p>25 THE WITNESS: Sorry.</p>
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<p>1 captures the entire time period when an ovarian</p> <p>2 cancer illness could occur; is that correct?</p> <p>3 A. That's not necessarily like an entire</p> <p>4 time. First of all, we don't know the precise</p> <p>5 number of years.</p> <p>6 But, yes, we know that it is a long-term</p> <p>7 exposure. So case-control studies allow us to</p> <p>8 ascertain long-term exposure. So that's a much</p> <p>9 more accurate reflection.</p> <p>10 Q. And you were saying one of the</p> <p>11 weaknesses of a cohort study is that it might not</p> <p>12 capture all of the ovarian cancer cases because</p> <p>13 ovarian cancer can develop over a long period of</p> <p>14 time; is that correct?</p> <p>15 A. Yes. After a particular agent, if it's</p> <p>16 related, you know.</p> <p>17 Q. Okay. And you mentioned, in fact,</p> <p>18 there's a sentence here, "It is important to</p> <p>19 determine the latency and induction between the</p> <p>20 exposure and the disease to assess the duration</p> <p>21 of follow-up"; is that correct?</p> <p>22 A. It is.</p> <p>23 Q. Okay. And then you give the example of</p> <p>24 smoking. And you talked about, if you looked at</p> <p>25 it for a 12-month follow-up study, that would not</p>	<p>1 A. So, yeah, months would be a problem.</p> <p>2 It's mostly -- I mean, yes, we have some bounds,</p> <p>3 but most of the studies we see, it is likely to</p> <p>4 have been, you know, several years after</p> <p>5 exposure.</p> <p>6 Q. And how do you know that? Which</p> <p>7 studies have you reviewed or analyzed that say</p> <p>8 that it's several years after exposure?</p> <p>9 A. Well, all of -- you know, the</p> <p>10 case-control studies that have provided data on</p> <p>11 duration of exposure and show evidence of</p> <p>12 duration responsiveness suggest that -- so, for</p> <p>13 example, Penninkilampi and others suggest that</p> <p>14 this is -- you know, while there are increased</p> <p>15 risks before both more than 20 years or more than</p> <p>16 3,600 applications as well as those are less, the</p> <p>17 risk is higher among those with higher duration.</p> <p>18 But, again, I cannot partition this at 20 or</p> <p>19 15.</p> <p>20 Q. Okay. You have a phrase in here that</p> <p>21 says "because ovarian cancer develops over many</p> <p>22 years."</p> <p>23 Is that an accurate assessment of your</p> <p>24 views?</p> <p>25 A. Where is that?</p>

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<p>1 Q. If you look at the next paragraph, 2 first sentence, last clause. 3 A. Yeah. 4 Q. Other plaintiffs' experts have stated 5 in their reports that the latency period could be 6 decades. 7 Would you disagree with that? 8 A. Yeah. I mean, when I say many years, 9 it could be -- yeah, I just -- 10 Q. You don't know? 11 A. I don't know the precise. I don't want 12 to quantify the number of years. 13 Q. Okay. I want to shift topics a little 14 bit here. You reference Linda Loretz's 15 deposition transcript in -- I think once in your 16 report. 17 If you would go to Page 7, I believe it is. 18 It's in a footnote. Footnote 1. 19 A. Mm-hmm. 20 Q. Now, did you read the entirety of 21 Dr. Loretz's deposition transcript? 22 A. Again, these are so many documents. I 23 mean, I reviewed, you know, not -- but I don't 24 know if I read the whole transcript. Yeah. 25 Q. Do you know how many days she was</p>	<p>1 not even a citation. I mean, it's -- I feel 2 that, and we were discussing that, you know, 3 could a randomized trial be here conducted. And 4 to my mind, it would be unethical. So... 5 Q. Well, yeah. But then you say, 6 "Defendants here have admitted this fact." 7 And so I'm just wondering what brought you 8 to that particular part midway in her deposition, 9 the second day of her deposition of a three-day 10 deposition. 11 A. Some of this has, you know -- it just 12 doesn't -- I don't know why I would, you know, 13 put it -- but it's sort of -- it's even 14 irrelevant if you take her out of it. Because, 15 you know, it's like, are we really going to do a 16 randomized trial? 17 Q. I agree with you. It's irrelevant. 18 A. Yeah. 19 Q. If you could go to Page 62 of your 20 report. You've got a caption there "Cosmetic 21 Expert Review Panel Report." 22 Do you see that? 23 A. Yes. 24 Q. Roman numeral XII? 25 A. Yes.</p>
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<p>1 deposited? 2 A. I don't recall. 3 Q. More than one day? 4 A. I don't know that. I'm sorry. 5 Q. So her deposition transcript, I'll 6 represent to you, is 1,133 pages in length. 7 Did you read all that? 8 A. No. I didn't agree that I read all of 9 them either. Yeah. 10 Q. Okay. I was a little confused because 11 I thought you had said, for hers, that you had 12 read the whole thing. 13 A. No. I didn't say I had read -- you 14 know, I have read the transcript, but it doesn't 15 mean that I read every, you know, precise word 16 and precise -- 17 Q. Do you know what her background is? 18 A. No, I don't. 19 Q. Do you know if she's a scientist? 20 A. I don't remember, you know, the 21 specifics of the transcript. 22 Q. How is it that you picked out this 23 quote then on -- that's Footnote 1 or this 24 citation, Footnote 1, Page 7? 25 A. Yeah. I mean, it's not even -- that's</p>	<p>1 Q. Do you know what the name of the 2 organization is that you're referring to in that 3 paragraph? 4 A. I don't know the name. 5 Q. Do you know if Dr. Loretz testified 6 regarding that review? 7 A. If I have cited her, then I have. 8 Q. Well, you didn't cite her on this 9 portion. That's why I'm asking about it. 10 A. I don't know. I mean, you're asking 11 all these different names. They're all -- if I 12 haven't cited her, then I haven't reviewed it. 13 Q. Okay. Have you heard of the Cosmetic 14 Ingredient Review? 15 A. Yes. 16 Q. Sometimes referred to as CIR? 17 A. Yes. 18 Q. Dr. Loretz, in her deposition, 19 references the CIR dozens of times, doesn't she? 20 A. Again, as I said, I didn't review the 21 entirety of the thousand pages. 22 Q. Okay. I'm just trying to understand 23 what you did review and you didn't. You wrote a 24 paragraph about the CIR. And I'm trying to 25 understand why you didn't reference Dr. Loretz</p>

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<p>1 when she testified about that.</p> <p>2 A. So, as you can see, it's reference to</p> <p>3 the published report, and, you know, I</p> <p>4 reviewed -- again, even that was lengthy</p> <p>5 document, and, you know, I wanted to review that</p> <p>6 for completeness and understand that.</p> <p>7 Q. Did you read the entirety of that</p> <p>8 report?</p> <p>9 A. As much as I can. Not every word in</p> <p>10 every sentence.</p> <p>11 Q. Okay. Do you know if the FDA plays a</p> <p>12 role in the CIR's review that you're referring to</p> <p>13 on Page 62 of your report?</p> <p>14 A. I'm not aware of the specific</p> <p>15 composition, but I know that FDA is -- attends or</p> <p>16 is a member or has some sort of role there.</p> <p>17 Q. Do you know who the Consumer Federation</p> <p>18 of America is?</p> <p>19 A. No.</p> <p>20 Q. Do you know if they play any role in</p> <p>21 the CIR report?</p> <p>22 A. I don't know. And maybe it's in the</p> <p>23 study and I can't tell you offhand who is in this</p> <p>24 panel.</p> <p>25 Q. It's also in Dr. Loretz's deposition.</p>	<p>1 A. Yes.</p> <p>2 MS. PARFITT: Objection.</p> <p>3 A. But specific to talc, you would want</p> <p>4 more diverse representation with gynecologists,</p> <p>5 oncologists, epidemiologists.</p> <p>6 So it's not that it was a criticism of the</p> <p>7 CIR review panel or whoever was on that as a</p> <p>8 dermatologist, but specific to it, did they have</p> <p>9 the expertise to -- and maybe they did, but I'm</p> <p>10 just pointing that out.</p> <p>11 Q. So you don't know, one way or another,</p> <p>12 whether they had the expertise?</p> <p>13 A. Yeah. I mean, from my understanding,</p> <p>14 they didn't have expertise in carcinogenicity and</p> <p>15 epidemiology.</p> <p>16 Q. What do you base that on?</p> <p>17 A. Yeah. I mean, you know, some of the</p> <p>18 names that are here, they were dermatologists.</p> <p>19 That's sort of my understanding.</p> <p>20 Q. Did you look them up and investigate</p> <p>21 what they do or what they have done in their</p> <p>22 careers?</p> <p>23 A. No. I have not.</p> <p>24 Q. Okay. So you're criticizing them as</p> <p>25 not having the capability of doing the review,</p>
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<p>1 That's the reason I'm exploring it.</p> <p>2 Do you know that one of the missions of the</p> <p>3 Consumer Federation of America is to represent</p> <p>4 consumers in connection with Cosmetic Ingredient</p> <p>5 Reviews?</p> <p>6 A. I'm not aware of that.</p> <p>7 Q. Okay. Do you know who was on the panel</p> <p>8 of the CIR review?</p> <p>9 A. No.</p> <p>10 Q. Do you know whether there were</p> <p>11 toxicologists who were part of the panel?</p> <p>12 A. I don't know that.</p> <p>13 Q. You criticize the panel makeup because</p> <p>14 it was "primarily composed of dermatologists."</p> <p>15 A. Sure.</p> <p>16 Q. Do you see that?</p> <p>17 A. Yes.</p> <p>18 Q. Do you know why dermatologists would be</p> <p>19 relevant to a review of cosmetics?</p> <p>20 A. Yes. I mean, yeah. But, of course,</p> <p>21 the majority of cosmetics are on -- you know,</p> <p>22 applied on the skin. Yeah. It would be</p> <p>23 relevant.</p> <p>24 Q. So they would be relevant to a CIR</p> <p>25 review?</p>	<p>1 but you don't really know their expertise?</p> <p>2 MS. PARFITT: Objection. Misstates his</p> <p>3 testimony.</p> <p>4 A. Yeah. It doesn't say -- first of all,</p> <p>5 it's not a criticism. It just says, what is the</p> <p>6 composition of the panel. It says it was</p> <p>7 composed of, you know, expertise in epidemiology</p> <p>8 and carcinogen -- so it's just sometimes</p> <p>9 panels -- and it may have been very appropriate</p> <p>10 for the 100 and whatever products that were</p> <p>11 evaluated by that panel.</p> <p>12 Q. Okay. One of the things that you</p> <p>13 say --</p> <p>14 A. Sure.</p> <p>15 Q. -- is that there was a -- the review</p> <p>16 was limited or limited its assessment to animal</p> <p>17 and clinical studies on talc that did not contain</p> <p>18 asbestos.</p> <p>19 Do you see that?</p> <p>20 A. Yeah.</p> <p>21 Q. You would agree that the CIR reviewed</p> <p>22 all of the epidemiological studies that were</p> <p>23 available at that time; correct?</p> <p>24 MS. PARFITT: Objection. Misstates</p> <p>25 testimony.</p>

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<p>1 A. I don't know -- you know, I know that 2 they reviewed the process and they looked at 3 studies, and I don't know if it was all 4 epidemiologic studies, but I think and I 5 understand that presumption was that talc does 6 not contain asbestos. I mean, that's what -- the 7 premise they started out with. 8 Q. Well, did the epidemiologic studies 9 make a distinction between talc and its 10 constituents or alleged constituents? 11 A. Yeah. I mean, there are -- as I cite 12 in my report, there are -- they don't make 13 distinctions, but they -- some of the studies -- 14 you know, some of the testimony we've discussed, 15 some of the, you know, testing we've discussed, 16 and some, you know, small publications suggest 17 that talc may contain asbestos. So you have 18 these evidence. 19 But the CIR review was already carried out 20 with the presumption that talc did not contain 21 asbestos. 22 Q. But they reviewed all of those studies 23 that you referenced, or do you not know what they 24 reviewed? 25 MS. PARFITT: Objection.</p>	<p>1 they asked -- this statement is about the 2 question they asked. They asked the question, 3 that talc fiber not containing asbestos, does it 4 cause. 5 So if they ask the question already, we know 6 that, they presume there was no presence of. So 7 it's about the question that I'm stating it. 8 Q. But the epidemiologic studies, when 9 they're analyzing talc use among women, they're 10 not making a distinction between talc that 11 contains or doesn't contain constituents. 12 They're talking about women who use products; 13 correct? 14 A. That is correct. 15 Q. So if your theory is correct and talc 16 contains harmful substances in addition to talc, 17 then the epidemiologic studies would have 18 reviewed women's exposure to those constituents; 19 correct? 20 A. Yeah. So, I mean -- so if you look at 21 what I've written, the review was carried out 22 under the flawed assumption that cosmetic grade, 23 you know, talc was -- did not contain that. And 24 also limited to talc that did not contain. And 25 also concluded that there was no evidence of talc</p>
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<p>1 A. I mean, I do not know every study they 2 reviewed. I'm just providing -- I don't know 3 every study that IARC reviewed. 4 Q. Well, you could find that out by 5 looking at the studies; right? 6 A. There's not enough time. There's so 7 many studies in this and so many reports, so many 8 assessments that -- 9 Q. But you're criticizing the CIR. 10 A. Yeah. 11 Q. And saying it limited its assessment. 12 A. Sure. 13 Q. And I just want to understand the basis 14 for that statement, and what you're saying, 15 testifying here today is you don't know what the 16 CIR reviewed. 17 MS. PARFITT: Objection. Misstates 18 testimony. 19 A. No. That, and we can look at it. 20 Let's look at the, you know, the -- 21 Q. But you made the statement. 22 A. Sure. 23 Q. And I'm asking you, sitting here today, 24 can you say what they reviewed? 25 A. Yes. I know they reviewed -- because</p>	<p>1 migration. 2 I do not say that, you know, there was no -- 3 they did not review the -- the epidemiologic 4 studies of talcum powder products. That's not -- 5 you know, they reviewed it. But I'm just 6 pointing out the limitations of that. 7 Q. Didn't CIR cite the very same studies 8 that were available as of 2013 that you cite in 9 your report? 10 A. Yes. 11 MS. PARFITT: Objection. Form. 12 A. Again, you know, I don't know if they 13 cite evidence of biologic plausibility. I don't 14 know if they cite evidence of talc migration. I 15 don't know how they interpreted the evidence 16 of -- just because they cited a study does not 17 mean that they interpreted the data in the same 18 way that I did. 19 So I don't know what studies specifically in 20 each section they cited. 21 Q. Okay. One of the things that you say, 22 "as a result of these serious methodological 23 shortcomings and funding biases." Let me ask you 24 about that. 25 A. Sure.</p>

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<p style="text-align: right;">Page 358</p> <p>1 Q. Is a review that's funded by an entity 2 with an interest in the outcome of that review 3 inherently flawed? 4 A. No. It isn't. And this is just, you 5 know, one of -- and, you know, it's a potential. 6 It should be potential for funding biases. It 7 doesn't mean that just because it was funded by 8 PCPC or CIR, it is, you know, biased. 9 But yes, I mean, so, for example, my report 10 and testimony, because it's funded by, you know, 11 should be examined for potential biases. Just 12 like, you know, CIR's report should be. 13 Q. I want to ask you about the timing of 14 things, because sometimes you have referred to 15 reports that were done a while ago. And in this 16 case, you do that with CIR. You say, "The 17 findings of this panel have been superseded by 18 several new epidemiologic studies," and so forth. 19 The line goes on. 20 Is it your opinion that -- well, let me ask 21 this way: At what point in time can we say that 22 the epidemiologic studies have sort of been 23 completed so you could rely on that information? 24 MS. PARFITT: Objection. Form. 25 A. Yeah. I mean, so you rely on</p>	<p style="text-align: right;">Page 360</p> <p>1 regulatory agency in late 2018. So things take 2 time. And, you know, people, scientists take 3 time to come to conclusions. 4 Q. Okay. Let's go to Exhibit 22. 5 A. Which is? 6 Q. That's the Berge -- I believe that's 7 how it's pronounced -- report? 8 MS. PARFITT: The Berge study? 9 MR. LOCKE: Yes, yes. I'm sorry. 10 BY MR. LOCKE: 11 Q. So if you could turn to Page 9, can you 12 read the last sentence right before 13 acknowledgments, beginning with the word 14 "several." If you could read it out loud, 15 please. 16 A. "Several aspects of our own results, 17 including the heterogeneity between case-control 18 studies and the lack of dose-response with 19 duration of and frequency of use, however, do not 20 support a causal interpretation of the 21 association." 22 Q. And they're referring to the 23 association between talc and ovarian cancer? 24 A. Yes. But other scientists, you know, 25 such as Penninkilampi, have concluded otherwise,</p>
<p style="text-align: right;">Page 359</p> <p>1 information from, what, 1982, Cramer one. But I 2 guess the question is -- I don't know, I'm not 3 trying to put questions in your mouth. But I 4 don't -- I can't -- because I evaluated the 5 causal question as of 2017 and didn't arrive at 6 an opinion until late 2018. 7 I did not go year by year and, say, okay, in 8 2005, when IARC looked at this, could we have 9 concluded, possible, a problem? In 2010, when 10 Langseth looked, or 2015. 11 So I did not segmentate it by time. And 12 you're just asking, even by epidemiologic study. 13 It doesn't work. You have to look at the whole 14 body of evidence and come to a conclusion. 15 Q. Isn't it true that, prior to the talc 16 litigation, no scientist had published an article 17 stating that talc causes ovarian cancer? 18 MS. PARFITT: Objection to form. 19 A. Yeah. I mean, you know, I think a lot 20 of these articles have talked about -- and 21 scientists don't necessarily publish statements 22 about causation, you know. 23 You have seen that Health Canada has clearly 24 stated that talc causes ovarian cancer. Yes, so, 25 in fact, not even scientists, but now we have</p>	<p style="text-align: right;">Page 361</p> <p>1 that there is, you know, suggestive of a causal 2 association. Health Canada has concluded 3 otherwise, that there's evidence of causal 4 association. 5 Q. But here we are in 2018, there's a 6 study that's published saying, "Does not support 7 a causal interpretation of the association 8 between talc and ovarian cancer"; correct? 9 A. Yes. I mean, you know -- 10 Q. Let me just ask you: So scientists 11 disagree about this issue? 12 A. That's why we are here. If we all 13 agreed, we wouldn't be here. 14 Q. Okay. Let me move to a different 15 topic. 16 MR. TISI: How much time do we have? 17 How much time do we have? That's okay. Just 18 write it on a paper. 19 MR. LOCKE: We're getting close. 20 Q. Okay. Can we go to Page 62 of your 21 report. 22 Now, did we already do that? Maybe we 23 already did that. Sorry. I don't want to have 24 to do things again. 25 A. Please don't.</p>

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<p style="text-align: right;">Page 362</p> <p>1 THE VIDEOGRAPHER: 6:36. 2 THE WITNESS: So we have 6 minutes, 36 3 seconds? 4 Q. You have 24 minutes. 5 A. Oh, sorry. 6 Q. Sorry. We already did that one. So 7 good there. 8 Let's go to Page 15 of your report. We were 9 talking just a moment ago about regulatory 10 entities and what they found. 11 In the middle of that paragraph or middle of 12 that page, there's a part that says, "Although 13 the FDA conducted a survey." 14 Do you see that? 15 A. Yes. 16 Q. And they found no asbestos fibers or 17 structures. 18 But then you, whatever you want to call it, 19 you can call it criticism or deficiencies or 20 disadvantages, you state, "The results were 21 limited, only four out of nine talc suppliers 22 submitted samples, and the number of products 23 tested was low." Is that correct? 24 A. Well, that is a correct restatement of 25 the facts. So it is not something that I made</p>	<p style="text-align: right;">Page 364</p> <p>1 don't know about the specifics, who are 2 manufacturers and -- yeah. But I know the 3 limitations of the survey. 4 And even they acknowledge that the study 5 could not prove that most or all talc-containing 6 cosmetic products currently marketed are likely 7 to be free. So even despite these -- whoever 8 supplied them and whoever, you know, tested them. 9 MR. LOCKE: We're almost there. Then 10 I'll turn it back over. 11 BY MR. LOCKE: 12 Q. Just one second. If you could go to 13 Page 59, please. Okay. 14 On Page 59, you've got a Roman numeral X 15 followed by a Roman Numeral III. Do you see 16 that? Talcum powder-induced inflammation. Am I 17 at the right place? 18 MS. PARFITT: I'm sorry, Tom. 19 MR. TISI: 59 of the report? 20 MR. LOCKE: Yeah. 21 A. It's probably 58. 22 Q. 58 of the report. Sorry. 23 MS. PARFITT: No worries. 24 Q. Okay. So you see that, Roman numeral 25 X, Roman Numeral III?</p>
<p style="text-align: right;">Page 363</p> <p>1 up. I mean, it is true that four out of nine 2 suppliers -- 3 Q. J&J was one of the entities that 4 supplied talc to the FDA; correct? 5 A. I didn't -- you know -- I didn't -- 6 that FDA document, you know, I'm not aware of who 7 supplied. 8 Q. You didn't look at it. You criticized, 9 but you didn't look at the fact that J&J 10 submitted talc samples and product to the FDA? 11 MS. PARFITT: Objection. Misstates his 12 testimony. 13 A. I reviewed the reference and I reviewed 14 the -- you know, so I'm not testifying I reviewed 15 talcum powder products and ovarian cancer. You 16 know, and I was looking at the evidence. But I 17 didn't look at whether J&J submitted samples or 18 Imerys submitted samples, no. 19 Q. And you don't know whether, then, the 20 FDA, in fact, tested the two J&J products at 21 issue in this litigation and found no asbestos 22 fibers or structures in the samples? 23 MS. PARFITT: Objection. Misstates the 24 survey. 25 A. I don't know -- I don't -- you know, I</p>	<p style="text-align: right;">Page 365</p> <p>1 A. Have we gone through this? I'll be 2 happy to go through it again. 3 Q. I want to ask you about something. 4 A. Sure. 5 Q. You have a statement, the first 6 sentence says, "Inflammation has long been 7 understood to be an important mechanism 8 underlying the development of ovarian cancer." 9 Do you see that? 10 A. Yes. 11 Q. And then you referenced 61. And if you 12 go to Exhibit 4, that is your list of references; 13 correct? 14 Well, for me, I was looking at it, because 15 it was broken out separately. But you could see 16 it at the back of Exhibit 10 as well. 17 A. Yeah. 18 Q. Do you see that, 61? 19 A. Yeah. 20 Q. And if you -- can you read the title of 21 the reference that you're citing to there? 22 A. The Ness study, is that? 23 Q. Right. The Ness study. 24 A. Possible Risk of Ovarian in -- Cancer. 25 Q. It's "Possible Role of Ovarian</p>

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<p style="text-align: right;">Page 366</p> <p>1 Epithelial Inflammation in Ovarian Cancer." 2 Now, you're citing that for "long been 3 understood to be an important mechanism," but, in 4 fact, the first word in the title is "possible." 5 A. Yeah. And you can clarify that. I 6 mean, this is about plausible mechanisms. 7 Q. But it certainly doesn't say it's long 8 been understood to be an important mechanism. 9 A. Well, I disagree. I mean, you know, 10 maybe that -- you can't cite all the articles for 11 each statement you make. I wish I did. 12 But inflammation, as I understand it, is an 13 important mechanism. And at least has been known 14 for a long time about ovarian cancer. And others 15 can opine in more detail. Is that citation the 16 most? Yeah, that particular citation has a 17 possible, you know, clarifier on that. 18 MR. LOCKE: Okay. Let me just see if 19 I've got anything else here. That's all I have. 20 THE WITNESS: Thank you. 21 MR. LOCKE: Thank you. Anyone else? 22 MS. PARFITT: Let's take a quick break 23 and see if we have any follow-up. 24 THE VIDEOGRAPHER: Off the record, 25 5:13 p.m.</p>	<p style="text-align: right;">Page 368</p> <p>1 ----- 2 E R R A T A 3 ----- 4 PAGE LINE CHANGE 5 REASON: _____ 6 _____ 7 REASON: _____ 8 _____ 9 REASON: _____ 10 _____ 11 REASON: _____ 12 _____ 13 REASON: _____ 14 _____ 15 REASON: _____ 16 _____ 17 REASON: _____ 18 _____ 19 REASON: _____ 20 _____ 21 REASON: _____ 22 _____ 23 REASON: _____ 24 _____ 25 REASON: _____</p>
<p style="text-align: right;">Page 367</p> <p>1 (A recess was taken.) 2 THE VIDEOGRAPHER: Back on the record, 3 5:26 p.m. 4 MS. PARFITT: Thank you. Dr. Singh, 5 the plaintiffs have no questions. I want to 6 thank you for your time today. 7 We would ask that Dr. Singh read and 8 sign. 9 MR. ZELLERS: Thank you, Doctor. 10 THE WITNESS: Thank you. 11 MR. KLATT: Wait. I've got 30 seconds. 12 THE WITNESS: I want to thank everybody 13 for a very professional, you know -- I've done 14 this a couple of times. And if I have raised my 15 voice, it hasn't been anything personal. It's 16 just been trying to explain something. 17 MR. ZELLERS: Thank you, Doctor. 18 THE VIDEOGRAPHER: And we're off the 19 record at 5:27 p.m. 20 (Deposition concluded at 5:27 p.m.) 21 22 23 24 25</p>	<p>1 ACKNOWLEDGMENT OF DEPONENT 2 3 I, _____, do 4 hereby certify that I have read the 5 foregoing pages, and that the same 6 is a correct transcription of the answers 7 given by me to the questions therein 8 propounded, except for the corrections or 9 changes in form or substance, if any, 10 noted in the attached Errata Sheet. 11 12 _____ 13 SONAL SINGH, M.D., M.P.H. DATE 14 15 Subscribed and sworn 16 to before me this 17 _____ day of _____, 20____. 18 My commission expires: _____ 19 20 _____ 21 Notary Public 22 23 24 25</p>

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Sonal Singh, M.D., M.P.H.

1 CERTIFICATE
2 COMMONWEALTH OF MASSACHUSETTS
3 SUFFOLK, SS.
4 I, Janet M. Sambataro, a Registered Merit
5 Reporter and a Notary Public within and for the
6 Commonwealth of Massachusetts do hereby certify:
7 THAT SONAL SINGH, M.D., M.P.H., the witness
8 whose testimony is hereinbefore set forth, was duly
9 sworn by me and that such testimony is a true and
10 accurate record of my stenotype notes taken in the
11 foregoing matter, to the best of my knowledge, skill
12 and ability; that before completion of the deposition
13 review of the transcript was requested.
14 I further certify that I am not related to any
15 parties to this action by blood or marriage; and that
16 I am in no way interested in the outcome of this
17 matter.
18 IN WITNESS WHEREOF, I have hereunto set my hand
19 this 17th day of January, 2019.
20
21
22 JANET M. SAMBATARO
Notary Public
My Commission Expires:
23 July 16, 2021
24
25

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Exhibit 35

**UNITED STATES DISTRICT COURT
DISTRICT OF NEW JERSEY**

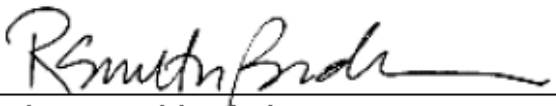
**IN RE JOHNSON & JOHNSON
TALCUM POWDER PRODUCTS
MARKETING, SALES PRACTICES,
AND PRODUCTS LIABILITY
LITIGATION**

MDL NO. 16-2738 (FLW) (LHG)

THIS DOCUMENT RELATES TO ALL CASES

**RULE 26 EXPERT REPORT OF
REBECCA SMITH-BINDMAN, MD**

Date: November 15, 2018



Rebecca Smith-Bindman, MD

The Relationship Between Exposure to Perineal Talc Powder Products and Ovarian Cancer

Expert Report

Rebecca Smith-Bindman, MD

Professor, Radiology and Biomedical Imaging, Epidemiology and Biostatistics, Obstetrics,
Gynecology and Reproductive Science and Director, Radiology Outcomes Research Lab
University of California San Francisco

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I. Executive Summary

Substantial evidence supports a strong positive association between ovarian cancer and genital exposure to talcum powder products and that regular exposure to talcum powder products causes ovarian cancer in some women. Talc is a naturally occurring mineral used in cosmetic products because of its desirable chemical properties such as being soft and absorbent. Women who have had regular exposure of the genitals (specifically the perineal region from the pubic area to the anal area) to talcum powder products are at increased risk of developing invasive ovarian cancer, in particular serous cancer, the most common and most lethal form. In the United States, a substantial portion of women report having ever used talc powder products at some point in their life. The most commonly reported frequency of talcum powder product use is daily. Women who use talcum powder products daily increase their risk of developing ovarian cancer significantly. Regular exposure causes ovarian cancer in some women.

I was asked to review the medical and scientific literature regarding the relationship between genital talcum powder product use and ovarian cancer and determine whether the relationship is causal. For this extensive analysis and report, I applied the same methodology with the same scientific rigor that I use in my research and clinical practice. I reviewed 43 relevant publications presenting scientific data on the association between ovarian cancer and exposure to talc powder products: 4 cohort studies, 8 systematic reviews, 2 studies that pooled data from multiple individual studies, and 30 case-control studies. I also read numerous review articles, and systematic reviews on related topics such as those completed by the International Agency on Research on Cancer (IARC). I also completed my own, new systematic review on of the studies that I reviewed as part of this report. This report contains my overview of these publications plus a detailed new systematic review of the studies that I conducted. After reading, evaluating, and summarizing these publications, in my expert opinion, I do not have any uncertainty that regular exposure to talc powder products increases a woman's chance of developing epithelial ovarian cancer. In my expert opinion, regular exposure to talcum powder products causes ovarian cancer

Quantifying the precise magnitude of the association is more difficult than establishing the association. The association will certainly vary by demographic and reproductive factors and whether women have other underlying ovarian cancer risk factors and exposures. With that caveat, **it is my opinion that women exposed to perineal talc powder products on a regular basis have about a 50% increase in their subsequent risk of developing invasive serous ovarian cancer**, compared to women who do not regularly use talc and even after accounting for other ovarian cancer risk factors. This estimate is supported by existing publications and my quantitative review of the scientific literature that focused on summarizing studies that addressed regular exposure to talc powder products as a risk factor for epithelial ovarian cancer, and in particular serous cancer. Talcum powder exposure is associated with other epithelial cancer subtypes (in particular, clear cell and endometrioid carcinoma), but because these cancers are less common, and because fewer studies have evaluated these cancers in sufficient numbers, quantifying the associations is more difficult. While some publications estimated talc powder products have a slightly greater risk of these cancer subtypes, others

estimated a slightly lower risk of these cancer subtypes. In my opinion, this risk is likely overall in about the same range as for serous cancer, but I would estimate slightly less at 40% increased risk.

The epidemiological evidence documents a strong, positive association between exposure to talcum powder products and ovarian cancer and that regular exposure causes ovarian cancer. The epidemiological evidence alone does not confirm the mechanism by which talc powder product increases ovarian cancer risk, nor does it confirm the specific component in talcum powder products that makes it carcinogenic. Nonetheless, the literature provides compelling evidence that exposure to talcum powder products leads to chronic inflammation and that the inflammation induces a strong biological response that results in the induction, promotion, and growth of cancer. Further, there is evidence that several highly carcinogenic agents are components of the talcum powder products. These include, most importantly, asbestos, a Group 1 carcinogen that the International Agency for Research on Cancer (IARC) has determined causes ovarian cancer. I have seen evidence that talcum powder products contain asbestos. Second, talcum powder products contain asbestiform talc particles which have a similarity in structure to asbestos fibers (and which IARC concludes are carcinogenic). Lastly, talcum powder products contain numerous heavy metals such as, nickel, chromium, (Group 1 carcinogens) and cobalt (Group 2 carcinogen) according to IARC. These components are carcinogenic (cause cancer) and can contribute to the carcinogenicity of talcum powder products. Observational and experimental data confirm that talcum powder product particles applied to the perineum can reach the fallopian tubes and ovaries through the vagina, supporting that talc particles applied to the perineum can deposit on the ovaries. Surgery that impedes the movement of particles from the perineum to the ovaries such as hysterectomy (uterine removal) or tubal ligation (tying or blocking the fallopian tubes to the ovaries), reduces the elevated risk of ovarian cancer from exposure to talcum powder products. This finding supports that local tissue response and inflammation in the fallopian tubes and/or ovaries from talcum powder products (with components) causes the elevated ovarian cancer risk.

In summary, **from my review of the scientific literature and my own analysis, it is my opinion that genital exposure to talcum powder products is an actionable and causative risk factor for ovarian cancer.** As a physician involved in women's health issues, I view talcum powder usage as a modifiable "lifestyle" risk factor that should be avoided because of the substantial risk to health and lack of therapeutic benefit. An elevated risk of 50% is significant and results in a large number of unnecessary ovarian cancers given the large number of women exposed. Depending on estimates of how many women regularly use talcum powder products, between 7% and 20% of all ovarian cancers and 14% - 39% of invasive serous cancers (the most aggressive and feared cancer type) are caused by the use of talcum powder products. These cancers can be prevented if women do not use talcum powder products.

II. Qualifications

Education and Employment

I am a professor of Radiology and Biomedical Imaging, Epidemiology and Biostatistics, Obstetrics, Gynecology and Reproductive Medicine, and Health Policy at the University of California San Francisco (UCSF) School of Medicine. I graduated from Princeton University with a degree in structural engineering (with combined majors in engineering and architecture) and attended UCSF medical school. My training after medical school included an internship, radiology residency, and clinical fellowship in women's health and a research fellowship in epidemiology and biostatistics in the UCSF Departments of Medicine and Epidemiology and Biostatistics.

I am a clinician-scientist. My clinical work includes one day a week in the Department of Radiology and Biomedical Imaging, with a focus on women's health imaging. I work in the ultrasound section, where a large proportion of the work is focused on the diagnosis of ovarian abnormalities (cancer and other functional issues). I run the UCSF Radiology Outcomes Research Lab, spending most of my time on clinical research and leading large epidemiological studies. I teach in the UCSF School of Medicine and Department of Epidemiology and Biostatistics.

Research Expertise

My research expertise is in epidemiology, outcomes research, comparative effectiveness, health services research, and dissemination and implementation sciences. My epidemiological studies have evaluated the quality, use, accuracy, predictive value, and impact of diagnostic testing on patient health. I have measured the risks and benefits of medical imaging in different contexts and different populations. Much of the research is in women's health, including diagnoses of cancers such as ovarian, endometrial, thyroid and breast. I have led many large, multi-institutional research projects. These projects are typically collaborative, involving researchers and clinicians with diverse expertise including radiology, obstetrics and gynecology, medicine, biostatistics, epidemiology, economics, demography, social sciences, medical informatics, radiation science, and dissemination and implementation science.

I have been a prolific researcher. I have led projects funded by more than 50 million dollars in research grants—entirely focused on cancer diagnosis and prediction. The research has been published in the most prestigious medical journals including the *New England Journal of Medicine*, *Annals of Internal Medicine*, *Journal of the American Medical Association*, *Journal of the American Medical Association Internal Medicine*, *Journal of the National Cancer Institute*, *Obstetrics and Gynecology*, and leading radiology specialty journals such as *Radiology* and *Journal of the American College of Radiology*.

Knowledge of Relevant Study Designs

Several of my published studies have been systematic, meta-analytic, quantitative reviews of the published literature. Meta-analyses review existing evidence on a topic and summarize

and re-analyze data from earlier studies. My systematic reviews focused on the diagnoses of endometrial cancer, breast cancer, and a range of birth defects including trisomy 21 (Down syndrome) and trisomy 18 (Edwards Syndrome). Many of my reviews were published in prestigious medical journals, reflecting their scientific rigor based on an in-depth understanding of how to combine and review results from different studies in a scientifically valid and reproducible way.

Several of my recent research projects quantified the variation in radiation dose associated with medical imaging and the expected impact of this variation on cancer outcomes. This work has brought attention to the need for better standards in medical imaging. I am currently leading two large, multi-institutional epidemiological projects on medical radiation funded by the National Institutes of Health. One project is collecting radiation dose measures associated with computed tomography (CT) imaging from more than 150 hospitals in the United States, Europe, and Asia and testing the impact of providing feedback and education to radiologists on average and high doses. The second project is a multinational epidemiological study on childhood cancer. This project is assessing the risk of cancer associated with medical imaging among 1 million children and 1 million pregnant patients after accounting for a range of other cancer risk factors. The study will be the first to quantify the risk of medical imaging including CT among a large group of patients and uses novel methods to accurately estimate radiation dose from imaging.

I have expertise in a range of research study designs. The projects I currently lead (each funded by the National Institutes of Health or the Patient-Centered Outcomes Research Institute for between 9 - 15 million dollars each) have designs selected to be appropriate for the research question. For example, the study assessing the risk of cancer from medical imaging uses a *case-control study design, in which data are collected on a group of patients and those with a condition (cases), are matched to similar patients without the condition (controls)*. Matching people with a disease to people of similar age, gender, and other factors who do not have the disease allows researchers to determine if circumstances such as exposure to a potential toxin influence disease development.

My project on medical imaging uses a *cohort design, comparing groups of people (cohorts) in a population, some exposed to a potential disease agent and some not exposed*, to see if the agent influences disease. My study on radiation doses from CT uses a *randomized controlled design, in which individual patients are randomly assigned to different treatments* so their effectiveness can be compared. I am studying lung nodules using a *cluster-randomized controlled trial design that randomly assigns groups of people in similar circumstances (for example because they all see the same doctor) to different treatments* so the effects of the treatments can be compared.

I have a deep understanding of how epidemiological studies are conducted. I understand what study designs are suitable to particular datasets, populations, and research questions and the advantages and disadvantages of each design. This is relevant as no single study

design is “best;” there are strengths and weaknesses of each. The most appropriate and valid study design varies based on the research question being asked.

Experience as a Medical Expert

For the National Academy of Medicine, I have contributed to several reports, including Saving Women’s Lives (2004), Improving Mammographic Quality Standards (2005), and Breast and the Environment: A Life Course Approach (2012), for which I wrote a review on the association between radiation exposure and breast cancer (Appendix). In addition to this research, I am actively involved in raising awareness of the need for better standards and greater safety around medical imaging, in particular related to radiation exposure. I have spoken at the US Food and Drug Administration, testified before the US Congress on several occasions, and worked with leading professional societies to focus attention on improving medical imaging safety. I have written several quality measures on radiation dose adopted by the National Quality Forum and developed educational tools to help physicians and patients understand the importance of minimizing radiation exposure from imaging.

Prior to providing my opinions on the association between talcum powder products and ovarian cancer, I had not reviewed the relevant literature and had not published in this area. As a result, I brought an unbiased perspective to my review. This report reflects my review of medical and scientific publications in this area (overviews and scientific studies), my own analysis, and review of documents shared with me by the lawyers who engaged me for this task. My curriculum vitae is attached as Exhibit A, the materials I considered are attached as Exhibit B, and my fees and prior testimony are attached as Exhibit C.

III. Background: Ovarian cancer and Talc as a Modifiable Risk Factor

Ovarian Cancer

Ovarian cancer is the seventh most common cancer in women and the fifth leading cause of cancer deaths in the United States.¹ In 2018, 22,240 women are expected to receive a new diagnosis of ovarian cancer and 14,070 women will die from it. Overall, about 1 in 78 women (1.3%) will be diagnosed with ovarian cancer in their lifetime and around 1 in 108 will die of it. About 224,940 women are currently living with ovarian cancer.² Most cases occur among older women; the median age at diagnosis is 62, although this varies by ovarian cancer type.² Ovarian cancer is frequently diagnosed at a late stage, when a cure is unlikely. Because so many ovarian cancers are diagnosed at a late stage, the overall mortality rate is high, and the overall 5-year survival is poor. With the poor prognosis and absence of a reliable screening test to find ovarian cancer early, it is a highly feared cancer for women and their physicians alike.

Histologic types

Cancers are classified by histologic type, meaning the type of cells that are involved. Understanding ovarian cancer histologic types is important because the risk factors, etiology and genetics of ovarian cancer can vary by histological type. Therefore, the importance of talcum powder products as a risk factor or cause can also vary by type.

Ovarian cancers (epithelial and non-epithelial) are a heterogeneous group of malignancies that vary in their pathological appearance, molecular biology, risk factors, etiology and prognosis.¹ Epithelial ovarian cancers have several histologic types; most fall into a small group of more common types including serous, endometrioid, clear cell and mucinous. About 90% of ovarian cancers are epithelial (meaning they arise from cells on the surface of the ovary or fallopian tube) and the most common type of epithelial cancer is serous carcinoma. Serous is not only the most common type of ovarian cancer, it is also the most lethal type of ovarian cancer. Further, it is the type of cancer that pathologists can most consistently, reliably, and reproducibly diagnose. Thus, epidemiological studies will have the greatest ability to document a clear association between serous ovarian cancer types and talcum powder products, if a connection exists. It is also the subtype that has been studied most from a molecular and pathologic research standpoint.

Table 1. Histologic Types of Ovarian Cancers Diagnosed Over 15 Years at the KP Washington (in press, JAMA Internal Medicine)		
Histologic Type	Number	Percent of Total Cancers
Papillary serous cystadenocarcinoma	52	36.6
Endometrioid carcinoma	17	12.0
Serous cystadenocarcinoma	15	10.6
Clear cell adenocarcinoma	12	8.5
Adenocarcinoma, NOS	11	7.7
Mucinous adenocarcinoma	7	4.9
Mixed cell adenocarcinoma	3	2.1
Serous surface papillary carcinoma	3	2.1
Granulosa cell tumor	3	2.1
Carcinoma, not otherwise specific	2	1.4
Mucinous cystadenocarcinoma	2	1.4
Mucinous cystic tumor of borderline	2	1.4
Carcinoma in situ	1	0.7
Squamous cell carcinoma	1	0.7
Papillary adenocarcinoma	1	0.7
Papillary serous cystadenoma, borderline	1	0.7
Adenocarcinoma with squamous meta	1	0.7
Granulosa cell tumor, malignant	1	0.7
Endometrial stroma sarcoma	1	0.7
Mullerian mixed tumor	1	0.7
Carcinosarcoma	1	0.7
Carcinosarcoma, embryonal	1	0.7
Teratoma, malignant	1	0.7
Astrocytoma	1	0.7
Marginal zone B-cell lymphoma	1	0.7
Total	142	100
Summary		
Serous carcinoma	70	49.3
Endometrioid carcinoma	17	12.0
Clear cell carcinoma	12	8.5
Mucinous carcinoma	9	6.3

My research group recently reported on the ultrasound appearance of ovarian cancers among a large cohort of women. The purpose of this cohort study was to quantify the risk of malignant ovarian cancer based on ultrasound findings. We described 142 new ovarian cancer cases in a population of 500,000 women enrolled in Kaiser Permanente Washington, an integrated health plan, between 1997 and 2008, including 72,093 women who underwent pelvic ultrasound. The distribution of cancer histological types is in Table 1. Serous carcinoma was the most common cancer type: In our cohort, it was 50% of the ovarian cancers. Serous carcinoma has the worst prognosis of the ovarian cancer types. Its high frequency and poor

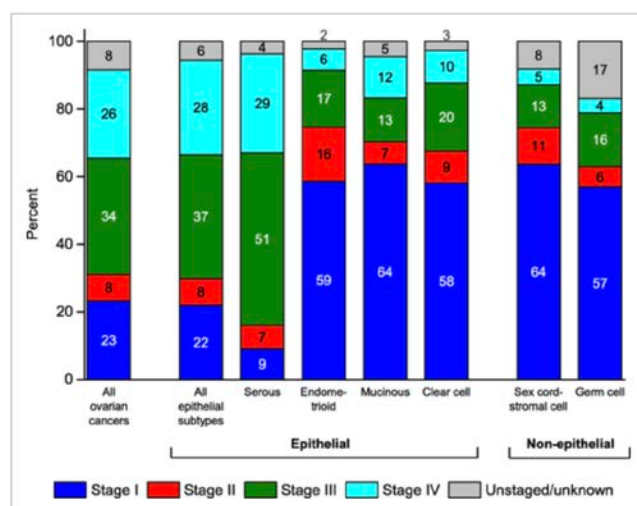
prognosis contribute to the high mortality rate for ovarian cancer overall. The other common histological types of ovarian cancer were endometrioid (12% in our data), clear cell (8.5% in our data), and mucinous (6.3% in our data).

Ovarian cancer types have large differences in stage of diagnosis (a strong predictor of survival) and prognosis independent of stage. The 5-year survival by histological type is in Table 2. Serous cancer is the most frequent and most aggressive, with an overall 5-year survival of 43% as compared with 82% for endometrioid. The survival is strongly influenced by stage at diagnosis, with higher stage numbers indicating more advanced stage.¹ Most serous carcinomas are diagnosed at stage III (51%) or IV (29%) (Figure 1),² for which 5-year survivals from the most recent data were 42% and 26%, respectively. These data reflect the aggressive nature of serous cancer.¹ In contrast, the majority (58% to 64%) of endometrioid, mucinous, and clear cell carcinomas are diagnosed at stage I, similar to nonepithelial tumors (Figure 1). Consequently, the 5-year survivals are 82%, 71%, and 66%, respectively, for endometrioid, mucinous, and clear cell carcinoma. Thus, these cancers behave very differently, even though all are ovarian epithelial cancers.

Table 2. Percent of Women Surviving 5 Years After Diagnosis by Epithelial Ovarian Cancer Type. Data From 2008–2013.

	All epithelial types	Serous	Endometrioid	Mucinous	Clear cell	Sex cord-stromal	Germ cell
Stage							
All	47	43	82	71	66	88	94
Stage I	89	86	95	92	85	98	99
Stage II	71	71	84	69	71	84	93
Stage III	41	42	59	30	35	61	90
Stage IV	20	26	29	13	16	41	69

Figure 1. American Joint Committee on Cancer Sixth Edition Stage Distribution (%) for Ovarian Cancer by Histology, US, 2007-2013, SEER 18 Registries, NCI, 2017. This shows that serious cancers are more likely to be diagnosed at state III, IV (green and teal), compared with other tumor types.



This summary reflects our current knowledge about ovarian cancer histologic types and their associated prognoses. As research results are reported, our knowledge will evolve. For example, recent studies suggest we need to improve our ability to distinguish between high-grade serous and endometrioid carcinomas. Other results suggest that many ovarian mucinous carcinomas are actually gastrointestinal tumors that metastasized to the ovaries and this realization is affecting the reported rates of ovarian mucinous carcinomas (which are declining).^{1,3,4} The categorization of noninvasive tumors classified as borderline is also under investigation and a topic of discussion in the field. These noninvasive tumors have historically been considered in the spectrum of ovarian cancer that have less aggressive behavior. However, many previously described borderline cancers are now generally considered non-malignant.

In summary, when assessing the carcinogenicity of talcum power products, this should focus on invasive serous carcinoma as the most important cancer (based on prognosis) and the most reliable cancer to identify (based on histology and understanding of cancer behavior).

Additionally, over the last decade, there has been research suggesting that many ovarian cancers originate from cells in the distal portion of the fallopian tube. Because the pathogenesis, treatment, and prognosis of serous cancers of the fallopian tube, ovary, and peritoneum are similar, these are now typically considered as a single entity.⁴ This consideration applies to the association with talcum powder product usage discussed in this report.

Risk Factors

Understanding ovarian cancer risk factors is important because analyzing the impact of talcum powder products exposure must consider *covariates, or other characteristics* that a woman might have that might also influence her ovarian cancer risk such as age, inherited genetic mutations, reproductive factors, or family history of cancer. Every risk factor does not have to be considered to come to a valid conclusion; indeed, this is not realistic within the limitations of medical research, and the bias introduced by the exclusion of some risk factors will be small. However, crude analyses that look at the risk of ovarian cancer from talcum powder products without adjusting for any other risk factors must be considered cautiously. For that reason, statistical analyses of research results often adjust for *confounding factors or variables that are covariates that hinder accurate calculation of an association*, for example between talcum powder products and ovarian cancer.

Numerous risk factors are identified for ovarian cancer.⁵ Unfortunately, few can be modified by therapies or lifestyle changes. Risk factors vary by histologic type⁵ but those that increase risk of ovarian cancer include personal or family history of ovarian or breast cancer, inherited mutations including BRCA1 and BRCA2⁶⁻¹⁰ advanced age, white race, increased education, and endometriosis. Other factors that may increase ovarian cancer risk due to estrogen exposure include having no pregnancies or advanced age at first birth, obesity, and postmenopausal hormone therapy.¹¹⁻¹³ Several factors are associated with reduced risk for ovarian cancer including breast feeding, multiple pregnancies, use of oral contraception,

tubal ligation, and removal of uterus, fallopian tubes, or both.¹⁴⁻¹⁸ Smoking is a possible risk factor for ovarian cancer, primarily mucinous subtype, although study results have not been consistent.^{5,19}

Risk factors vary by cancer type. For example, serous cancer is more strongly associated with reproductive risk factors than mucinous tumors²⁰⁻²² and different histologic types have different molecular and genetic profiles.²³⁻²⁵ Serous tumors are more likely to have a cancer-promoting mutation in the p53 gene, whereas similar KRAS mutations are more common in mucinous tumors. Over time, the occurrence of ovarian cancer has changed, in part due to changes in risk factors. For example, small declines in the rates of endometrioid and serous cancer are attributed to declining use of hormone replacement among postmenopausal women.

Etiology: Origins, Causes, Development and Inflammation

Our understanding of the etiology and course of ovarian cancer continues to evolve. Hereditary genetic predisposition increases risk, but overall, accounts for only a small proportion of cancers. And even in women with hereditary genetic mutations, not all will develop ovarian cancer. The majority of ovarian cancers are now believed to arise in the distal portion of the fallopian tube. By convention, fallopian tube, ovary and peritoneal cancers are considered as a single entity. The most widely accepted mechanism for initiation, promotion and progression of ovarian cancer is tissue inflammation leading to a series of responses that result in cancer.

There is very clear and extensive scientific literature describing the relationship between inflammation and cancer across many anatomic areas. Chronic inflammation, and even subtle, subclinical inflammation, is associated with an increased risk of cancer.²⁶⁻²⁸ Many inflammatory conditions predispose to cancer development. Diverse factors that lead to inflammation - infection, chemical exposures, physical agents, autoimmune factors, and even inflammatory reactions of uncertain etiology - can lead to an increase in cancer incidence. For example, there are well described and accepted causal pathways linking inflammation in the etiology of bladder cancer (schistosomiasis, toxic chemicals), cervical cancer (papillomavirus), gastric cancer (H Pylori), colon cancer (inflammatory bowel disease), liver cancer (hepatitis), mesothelioma (asbestos) and ovarian cancer (pelvic inflammatory disease and endometriosis). The biological pathways associated with inflammation include stimulation/interference with a range of biological responses that are involved in initiation of cancer, promotion of cancer, and progression of cancer. Oxidative stress resulting from inflammation can impact all stages of cancer development including cancer initiation (DNA is damaged by introducing gene mutations and structural alterations of DNA leading to inhibition of DNA repair and malignant transformation); promotion (which may be manifest as abnormal gene expression resulting in cell proliferation and decrease apoptosis) and progression (further DNA damage and enhancement of cell growth.²⁹ Local inflammatory response can lead to signaling molecules such as cytokines, chemokines, prostaglandins, growth transcription factors, microRNAs having higher expression that can promote cancer

development and can create a favorable microenvironment for the development and progression of cancer.³⁰ Inflammation impacts every step of tumorigenesis, from initiation through tumor promotion, and extending to metastatic progression. Similarly, the most compelling mechanism for the etiology of ovarian cancer is that of chronic inflammation and scarring in the ovary that leads to malignant transformation and cancer progression. This mechanism involves cell proliferation, oxidative stress, DNA damage and gene mutations.³¹⁻³³ The microenvironment of ovarian cancer contains a broad spectrum of pro-inflammatory cytokines and chemokines contributing to the mechanism.³⁸

There are many processes that can lead to inflammation and tumorigenesis and the exposure to talcum powder products is one such exposure that can strongly enhance the tumor promotion or progression as seen in in vitro and animal studies. For example, normal repeated ovulation leads to injury of ovarian epithelial cells and transformation to malignant cancer cells that can be enhanced by various factors such as talc or asbestos particles. Exposure to talcum powder products can induce the production of pro-oxidant enzymes and reduced production of antioxidant enzymes leads to malignant transformation. In support of inflammation from talcum powder products causing cancer, hysterectomy or bilateral tubal ligation, which would significantly limit ovarian exposure to inflammatory mediators, and toxins, is associated with reduced ovarian cancer risk.

Relationship Between Ovarian Cancer and Talcum Powder Products

The epidemiological evidence described in detail below demonstrates a strong and positive association between exposure to talcum powder products and ovarian cancer and that talcum powder products cause ovarian cancer. Although epidemiologic evidence alone does not provide a definitive mechanism or pathophysiological process that accounts for the increased risk, the evidence for inflammation as described above is very strong. Similarly, epidemiological evidence alone does not confirm the specific component or ingredient in talcum powder products that is responsible for its carcinogenesis. Nonetheless, several constituents within talc powder products are worth highlighting as they may be acting individually or together to create the carcinogenicity of talc powder products inasmuch as they are individually highly carcinogenic

Why Talcum Powder Products were Initially Suspected as Causing Ovarian Cancer

In 1978 samples of commercial body powders were shown to contain asbestos silica minerals. Asbestos was a known carcinogen and about half of the powder samples contained respirable quartz, a lung carcinogen. Concerns were primarily raised that inhaled powder could cause lung scarring, lung cancer, or mesothelioma. In 1971, Henderson observed talc particles deeply embedded in ovarian cancer tissue. The authors noted the close association of talc to the asbestos group of minerals.³⁹ Further concern was raised, in 1982 when a case-control study of ovarian cancer that collected information on talcum powder use reported an increased risk with perineal dusting.⁴⁰ These findings were reported in widely circulated newspapers such as The Globe, raising concern that the powders were carcinogenic because

of the contamination with asbestos, using the relationship between asbestos and lung cancer and mesothelioma as the basis for the concern.

Carcinomic of Constituents of Talc Powder Products

There are hundreds of different constituents and ingredients within talcum powder products in addition to platy talc. Many of these are Group 1 carcinogens (such as asbestos, talc containing asbestiform fibers, heavy metals, and some fragrance chemicals) that likely contribute to the carcinogenicity of the products.

Asbestos

Asbestos is the generic commercial designation for a group of naturally occurring mineral silicate fibers; serpentine mineral fibers are called chrysotile, and amphibole minerals include actinolite, amosite, anthophyllite, crocidolite and tremolites. Talc is formed by complex geological processes acting on pre-existing rock formations with diverse chemical composition. Small amounts of chrysotile (asbestos) may occur in these talc deposits ^{41,42} When talc is mined it may contain asbestos fibers ^{42,43} A study of 21 consumer talcum powders obtained from retail stores in 1971–1975 reported that 10 contained concentrations of asbestos fibers ranging from 0.2 to 14%. ^{41,44} Because of concern that asbestos was present in talcum powder products and the known carcinogenicity of asbestos, it has been reported that voluntary guidelines were established by the cosmetic industry in 1976 to limit the content of asbestos fibers in commercial talc preparations. While currently talcum powder products are believed to be free from asbestos, the data on its continued presence are strong. I have seen evidence of continued presence since 1976. ⁴⁵⁻⁴⁸ For example, Longo tested approximately 50 samples that were taken between the years 1960 through 2000 and the majority of sample are positive for asbestos. ⁴⁷

Asbestos is a known and potent human carcinogen. Asbestos is highly carcinogenic to the lungs, lining of the lungs, and larynx. ⁴⁹ Asbestos is also highly carcinogenic to the ovaries. ⁴⁹⁻⁵⁸ Women working in asbestos-manufacturing industries have an increased risk of ovarian cancer. IARC reviewed the association between asbestos exposure and ovarian cancer in 2012. To assess the relationship, IARC reviewed data primarily from large epidemiological cohort studies of women who had occupational exposure to asbestos as well case-control studies on non-occupational exposure. The context and lengths of exposures varied, along with the type of asbestos fibers to which the women were exposed and the study designs and assessments. Nonetheless, the results were consistent. Most, but not all, were statistically significant and documented a strong and compelling causal association between exposure to asbestos and ovarian cancer, largely the result of the association from cohort studies of women with substantial occupational exposures. ⁵⁰⁻⁵⁴ **IARC concluded that there is sufficient evidence that asbestos is carcinogenic in humans and that asbestos causes cancer of the ovary.** This is the highest risk category. ⁴⁹ IARC also concluded that this categorization applied to all forms of asbestos and to talc containing asbestiform fibers (talc in a fibrous habit or fibrous talc)). IARC also concluded that asbestos is carcinogenic based on animal studies. Camargo completed a systematic review of the relationship between women occupationally exposed to asbestos and ovarian cancer. ⁵⁹ The authors found that of the 18 cohort studies

the pooled standard mortality estimate for ovarian cancer was 1.77 (95% confidence interval, 1.37-2.28). The range in reported SMR values was 1.1– 5.4 across the included cohort studies and the most common values were 2–3. This study supports IARC's conclusion that exposure to asbestos causes ovarian cancer.

IARC explicitly stated that the findings in this Monograph applied to all forms of asbestos, as well as asbestiform talc (fibrous talc).

I reviewed many publications and primary research studies, including experimental and basic science models showing molecular and genetic cancer-promoting changes to cells that occur from exposure to asbestos fibers. I also strongly conclude that asbestos causes ovarian cancer.

Talc

Talc is the primary component of talcum powder products. The chemical structures of talc and asbestos can be similar. While talc particles are usually plate-like, talc can also grow as a fiber which is similar to the group of minerals called asbestos. Both are magnesium silicate and when talc has the fibrous form it is called asbestiform because of its similarity to asbestos. The form of the talc fibers is long and thin, with parallel bundles that are easy to separate from each other, and closely resembles the physical appearance of asbestos minerals. The histologic appearances of mesothelioma and ovarian cancer are similar. The known carcinogenicity of asbestos for lung, pleural, peritoneal and ovarian cancer has led to the theory that the similarity in the fibers and the resulting cancers suggests that talc works mechanistically within the ovary to induce cancer in a way that is similar to how asbestos in the chest induces mesothelioma.

Early observations demonstrated talc particles in both malignant and normal ovaries establishing a route from the perineum to the ovary and shows that many women are exposed to talc.^{39,60} In 2006, the International Agency for Research on Cancer (IARC) reviewed the data on cosmetic (perineal) talc ("non-asbestiform") application and concluded that it is possibly carcinogenic to humans.⁶¹ This is not as strong a recommendation as they made for asbestos and ovarian cancer, but nonetheless is a strong recommendation. IARC classified genital-perineal use of talc-based powder as possibly carcinogenic. Exposure to talc particles can induce an inflammatory response, either directly at the ovary and ovary-fallopian tube juncture, causing local irritation from talc particulates or through more generalized peritoneal inflammation. The mechanism that can lead to cancer is local irritation by talc fibers that disrupts the epithelial surface, increasing rates of cell division and DNA repair that can lead to mutations. Also increased are oxidative stress and cytokine production, indicating inflammation. Fibers that are incorporated into the epithelial cells enter ovarian tissue. This inflammation initiates a series of responses, supported by research, that promote cancer. The reduction in the elevated risk of ovarian cancer from talcum powder exposure after hysterectomy or tubal ligation supports the mechanism by which local irritation and inflammation to the ovary from talc or asbestos causes an elevated cancer risk.

Heavy Metals

Talc powder products can contain Group 1 metals that are considered by IARC as carcinogenic to humans.^{44,49}

This includes nickel compounds which IARC documents cause lung and nasal cavity and paranasal sinus cancer. (IARC100c-10, 2012). Nickel compounds “cause DNA damage, chromosomal aberrations, delayed mutagenicity and chromosomal instability ... and nickel compounds act as co-mutagens.” Talcum powder products also contain Chromium (VI) (IARC100c-9, 2012) another Group 1 carcinogen, where there is sufficient evidence in humans for carcinogenicity (to the nose and nasal sinus). The mechanism includes “DNA damage, generation of oxidative stress and aneuploidy. Talc powder products can also contain Group 2A metals that are considered probably carcinogenic to humans, such as Cobalt which can be found in talc powder products.⁶² IARC considers Cobalt metal with tungsten carbide as probably carcinogenic to humans (Group 2A), but worth noting that a number of the IARC working group members supported an evaluation in Group 1 because they judged the epidemiological evidence to be sufficient, leading to an overall evaluation in Group 1; or they judged the mechanistic evidence to be strong enough to justify upgrading the default evaluation from 2A to 1. The majority of working group members, who supported the group 2A evaluation, cited the need for either sufficient evidence in humans or strong mechanistic evidence in exposed humans. Cobalt metal without tungsten carbide is also considered possibly carcinogenic to humans (Group 2B). Cobalt sulfate and other soluble cobalt(II) salts are possibly carcinogenic to humans (Group 2B).

Any and all of these heavy metals can cause ovarian cancer through an inflammatory mechanism

Fragrances

There are more than 150 different chemicals added to Johnson’s Baby Powder and Shower to Shower products. I reviewed the expert report from Dr. Crowley that concludes that some of these chemicals may contribute to the inflammatory response, toxicity, and potential carcinogenicity of Johnson & Johnson’s talcum powder products. I concur with his opinion.⁶³

IV. Overview of Publications on Genital Use of Talc Powder Products and Ovarian Cancer

To understand the relationship between exposure to talcum powder products and ovarian cancer, I searched for and reviewed scientific papers on this topic. I used several searchable publication databases (Scopus, Embase, Pubmed) and manually searched the reference lists of all articles I found, including a large number of reviews. The results of my review follow the explanation of the main types of studies and articles.

Explanation of study designs and article types

Nearly all published studies that I reviewed used one of two designs: case-control and cohort. Each design has strengths and biases. The commonly held view is that cohort studies are better than case-control studies. This is a misconception thus it is worth explaining their differences. Many articles I reviewed were systematic reviews, which are also explained.

Case-control studies compare people with a condition (cases) by matching them to people with similar characteristics who do not have the condition (controls) to determine the effect of a potential disease-causing factor. They often analyze existing data retrospectively, after people have been diagnosed, and involve tens or hundreds of patients. Cohort studies compare cohorts, or groups of people, who were exposed or not exposed to a potential disease agent. They often collect data on people prospectively, before they develop a disease and track their health over time. Both case-control and cohort studies, if well done, can provide accurate and meaningful information about statistical associations. In general, however, the risk of bias is greater for case-control studies. (An example is recall bias, in which women are more likely to remember and report exposure to talc powder products after they have been diagnosed with cancer compared to women without a diagnosis, perhaps because diagnosed women heard that talc powder products is harmful and are more likely to remember talc use). Nonetheless, when studying a rare disease, the case-control design is frequently highly efficient and desirable as it allows you to assemble a much larger number of cases and can delve in great depth for particular exposures. You can identify all patients who have the outcome of interest, and then query them (and some control group) about any antecedent exposure. The identification of the control group is very important. My large, National Institutes of Health-funded study of cancer risk factors in children is employing a case-control design. This design permits us to ask very detailed questions of a small number of individuals about their various exposures.

Cohort studies potentially avoid some biases of case-control studies since exposures are prospectively assessed and quantified, that is, before disease outcomes. This design also has limitations, though. An extremely important limitation is that because cohort studies are expensive and time-consuming, they rarely focus on a single, narrowly defined question such as the association between regular use of talcum powder products and cancer. Usually, researchers investigate a broad range of questions in cohort studies, so asking patients in-depth questions about any given topic is difficult, especially since tens of thousands of patients may be surveyed on many topics. Further, in cohort studies, having comprehensive assessment of outcomes on all individuals in the cohort is extremely important. Losing patients to follow up (meaning researchers cannot contact or find records on a participant) leads to study bias. The other disadvantage of cohort studies is that a very large number of patients must be assessed over a long period of time to see who will develop a rare outcome (like ovarian cancer). Because of this, typically there will be far fewer patients with disease in a cohort study as compared with case control study (like in this case).

The small number of cohort studies I found on the relationship between talcum powder products exposure and ovarian cancer did not focus on the details of this topic. While they may have included questions about talcum powder exposure, they were not sufficiently nuanced to provide meaningful information. Thus, in most of the cohort studies I found, measurements of exposure were poor, not specific, or inaccurate. Further, several had very short follow-up periods with data or information about the time before the cancer occurred. This negates an advantage of cohort studies, which is being able to learn about exposures before the cancer, eliminating recall bias.

Systematic reviews quantitatively summarize results across multiple studies. One of the rationales of this study design is that individual studies may not have enough participants to yield meaningful results because they are too small or insufficiently powered. Combining small studies can provide more stable and reliable summary estimates of the effects of disease agents and risk factors. Further, a systematic review may be better than a single study, as it provides broader evidence of the results and includes patients from diverse settings. However, in order to statistically combine and summarize the data from different research studies into a single systematic meta-analytic review, the combined studies must ask the same research question and follow sufficiently similar and rigorous scientific methods. A meta-analysis does not compensate for gaps or flaws in an original study: Combining three poorly performed studies does not yield reliable summary estimates even though there may be three times the number of patients. Similarly, combining studies that ask different research questions (for example, assessing women of different ages for a disease in which age is an important risk factor) does not provide reliable summaries. Results from different studies often vary when the studies ask different research questions, have different criteria for including participants, or use different methods. I raise these issues to point out that systematic reviews must be read extremely carefully to ensure that their conclusions are valid.

Table of Reviewed Publications

I identified and reviewed 43 English-language publications that provided quantitative data based on epidemiological studies about the relationship between genital talcum powder exposure and ovarian cancer (Table 3). This list includes 4 cohort studies, 8 systematic meta-analytic reviews, 2 studies that pooled individual patient-level data from several research studies, and 30 case-control studies. One study contributed both the systematic review and a case control study. I also read multiple review articles that are not included in the table. The epidemiological studies were published between 1982 and 2018. I have described the results organized by study design below.

Most studies used a case-control study design with a small number using a cohort study design. Although some studies assessed powder use to any part of the body or assessed the use of talcum powder on diaphragms, condoms or sanitary napkins, the primary research question that I focused on in my review and that was assessed in all included individual research studies, was whether genital area exposure to talcum powder increases risk of epithelial ovarian cancer. Occasionally, study authors assessed combination exposures (i.e., to genitals and other body parts). These studies were included as long as genital powder use was assessed. Nearly all studies adjusted for known ovarian cancer risk factors, but those factors varied. The vast majority of studies found a positive association between any exposure to talcum powder products and cancer. However, the sample size of some studies was small and resulted in high statistical uncertainty. Because of these and other limitations, quantifying a precise association between exposure and cancer was difficult from my review of the literature. The data for some studies may have shown that effects of talcum powder exposure (measured as odds ratios, ORs) was meaningful for cancer development, but with statistical

uncertainty; whereas other studies showed the reverse results, with ORs not showing a positive association, but statistical parameters suggesting that a meaningful association was nonetheless possible because of wide confidence intervals. Therefore, I thought a more precise and careful review was called for. The number of individual women included in each study and the reported or estimated effect size for “any exposure to talc” (adjusted for other risk factors such as age) are in Table 4.

A subset of the studies quantified the *intensity (frequency)* of each woman’s exposure to talc to assess the importance of use patterns (e.g., if a single lifetime use or weekly, monthly, or daily use increased ovarian cancer risk) or *dose dependency (links between the number of exposures and cancer risk, e.g., if doubling exposure doubles risk)*. Further, a subset of studies stratified by cancer type (invasive vs. low malignant potential/borderline) and whether the risks varied by histological types including the four dominant types of serous, mucinous, clear cell, and endometrioid cancer.

Studies that provided data on the frequency of talc use and association by histologic type were included in a separate systematic meta-analytic review that I conducted as part of my review of the literature to include in this report. The reason I completed my own statistical review is further explained below.

Quantifying Exposures

A large proportion of women will have used talcum powder products, highlighting the importance of this issue. However, publications that focus on women reporting “any” genital exposure to talc (i.e., talc at any point in life and for any duration) may be too broad to provide meaningful information. For example, “any use” will include women who applied talc powder products three times over five decades and women who used talc powder products daily, whose might have had 20,000 applications and exposures in comparison to three. Defining a variable as any use is the equivalent to creating a variable of any smoking use, that combines data on individuals who tried one cigarette in their life with individuals with 50 pack years of tobacco use. Combining data on women with infrequent or sporadic exposures with data from women with frequent, sustained use leads to imprecise results, masking any causal associations. Therefore, I selected the studies for my own review that quantified the frequency of talc powder products use as having the most informative data and included them in a separate systematic review.

Summary of Data

I grouped the research studies by their study design. What follows is my review of the cohort studies, systematic review studies, pooled data studies, followed by my own review.

Cohort Studies

Four cohorts (Gertig, Gates, Houghton, Gonzalez) have been published on talcum powder products and ovarian cancer.

Cohort 1: Gertig (2000) ⁶⁴

This first cohort study assessed the relationship between perineal talc and ovarian cancer within the context of the US Nurses' Health Study, a prospective study of 121,700 female registered nurses in the United States who were aged 30–55 years at enrollment in 1976. These are mostly premenopausal women. While talc exposure was not an initial part of the study, questions about talc, including measuring frequency of exposure, were added in 1982; a large subset of the cohort (78,630 women) completed these questions and were included in analyses. Among these women who were followed for 14 years, 307 were diagnosed with epithelial ovarian cancer. After adjusting for confounding variables, the *relative risk (RR)* of developing ovarian cancer (*the likelihood of ovarian cancer in talc users compared to nonusers, with higher RR meaning increased risk stronger association*) among daily users of talc was RR 1.12 (95% confidence interval [CI] 0.82, 1.55, *a measure of statistical uncertainty, with wider ranges indicating greater uncertainty*), which was not statistically significant. However, when results were classified by histologic subtype, the RR of invasive serous cancers was significantly elevated among any users of talc (RR 1.40, 95% CI 1.02, 1.9) and the RR of invasive serous cancer among daily users of talc was higher at RR 1.49 (95% CI 0.98, 2.3).

In this cohort study, the researchers assessed talc exposure before cancer diagnosis, avoiding the possibility of the recall bias of case-control studies. This was a strong strength of this study. A potential weakness was that frequency (i.e. daily) but not duration (number of years) of talc use was measured, so a clear lifetime exposure measure was missing. The researchers nonetheless quantified exposure at the time the talc questions were asked, which was probably strongly associated with prior use (i.e. an approximation on ongoing use). **This study provides strong evidence that perineal exposure to talc increases the risk of invasive serous ovarian cancer, particularly among daily users of talc, with about a 50% increased risk,** which is substantial and meaningful.

Cohort 2: Gates (2010) ²⁴

This study assessed the association between ovarian cancer risk factors and incidence of ovarian tumors by histological type using data from the US Nurses' Health Study combined with data from the Nurses' Health Study II, which included a second period of enrolling participants. Unfortunately, talc use was assessed only on the first survey and not assessed among patients enrolled in the Nurses' Health Study II. Thus, this extends the period of follow up from the initial NHS but does not include greater information about risk factors. Results were presented for any talc powder products use and not for frequency of use. **Thus, this report does not add to a meaningful assessment of the relationship between talc use and ovarian cancer because it used exactly the same patient group as Gertig (2000) but provided less information to quantify the frequency of talc use.**

Cohort 3: Houghton (2013) ⁶⁵

This study assessed perineal talc powder products use and risk of ovarian cancer in the Women's Health Initiative Observational study, in which postmenopausal women aged 50–79 were enrolled in a prospective cohort of women from 40 clinical centers across the United

States in 1993–1998. Overall, 61,576 women were included in analyses, including 429 diagnosed with ovarian cancer. Perineal powder use was assessed at the start of the study. Participants were asked if they **ever used talc powder products** on their private parts (genital areas). Those who responded yes were asked about duration (years) of use. Women were followed for a mean of 12 years and the median age of participants was 63. **Talc powder products use was associated with a 12% increase in risk of ovarian cancer after accounting for covariates** (RR 1.12, 95% CI 0.92, 1.36). When limited to women who used perineal powder for 20 years or more, the RR was 1.10 (95% CI 0.82, 1.48). When limited to serous ovarian cancer, the RR was 1.13 (95% CI 0.84, 1.51.) **The primary limitation of the study was that frequency of talc powder products use was not assessed—and thus the authors could focus only on any talcum powder use.** The imprecision in estimation of talcum powder exposure makes the results not terribly meaningful. The second limitation was the relatively short follow-up of 12 years to identify ovarian cancer diagnoses.

Cohort 4: Gonzalez (2016) ⁶⁶

The Sister Study (2003–2009) followed 50,884 women ages 35 to 75 years in the US and Puerto Rico who had a sister diagnosed with breast cancer. After excluding participants who had bilateral oophorectomies, ovarian cancer, or were lost to follow-up, 41,654 participants were included. At baseline participants were asked about douching and talc use during the previous 12 months, and during follow-up (median of 6.6 years) 154 participants reported a diagnosis of ovarian cancer. The authors computed adjusted hazard ratios (HR) and 95% confidence intervals (CI) for ovarian cancer risk using the Cox proportional hazards model. The authors found no significant association between baseline perineal talc use and subsequent ovarian cancer (HR: 0.73 CI: 0.44, 1.2). **The primary limitations of this study are that the authors combined a large number of potential talc exposures into a single category, including genital talc use in the form of powder or spray applied to a sanitary napkin, underwear, diaphragm, cervical cap, or vaginal area. Further, the authors categorized the exposure based on the 12 months prior to enrollment as a dichotomous ever/never.** Thus not only was it an ever versus never category, the ever category was extremely broad, making the lack of association less meaningful. Further, there are several other factors that make the results questionable, including lower than expected proportion of women who report any exposure to talc powder products, and the lack of a validated approach to ascertainment of ovarian cancer.

Cohort Studies: Summary

Analyses of data from the US Nurses' Health study and the Women's Health Initiative estimated that women who report any exposure talc powder products will have a 12% increase in ovarian cancer compared to women who never report talc powder products use, although this estimate was not statistically significant. The primary limitation of this estimate is that it is based on *any talc powder products* use, which is a weak, crude predictor. Similarly, while the results from the Sisters study did not identify a significant association between talc powder products use and ovarian cancer, they too used a measure of ever use, and included a large number of different types of exposures that would not be expected to measure a single exposure. The most important and meaningful conclusion that I draw from the cohort studies

is from the Gertig 2000 study using data from the US Nurses' Health study: That women who are **daily users of talc have an approximately 50% increase (OR 1.49) in their risk of invasive serous** cancer, the most lethal and frequent type of ovarian cancer.

Systematic Reviews

I found nine systematic reviews that summarized the relationship between talc and ovarian cancer, summarized below. These reviews were completed using various subsets of the full list of publications. The systematic reviewers are presented with the most recent first, because the more recent studies tended to be more complete, comprehensive and the most methodologically rigorous.

Systematic Review 1: Penninkilampi (2018) ⁶⁷

This comprehensive systematic review of the association between any genital use of talcum powder products and ovarian cancer conducted a stratified analyses showing the association by frequency of talc use and histologic cancer subtype. The methods of the study are well described. The researchers identified studies using six electronic databases and reviewed publications with 50 or more cases of ovarian cancer. They identified 24 case-control studies describing 13,421 cases and the three cohort studies (890 cases, 181,860 person-years) described above. Any reported use of perineal talc powder products was associated with increased risk of ovarian cancer compared to no use (OR = 1.31; 95% CI 1.24, 1.39). Women with more than 3600 lifetime applications had slightly higher risks (OR = 1.42; 95% CI 1.25, 1.61). Women who reported long-term (>10 years) talc use also had an increased risk (OR 1.25; 95% CI = 1.10, 1.43). The association between any talcum powder product exposure and ovarian cancer was limited to studies that used a case-control design. The cohort studies showed an increased risk of serous invasive cancer subtypes for perineal talc use compared to no use (OR = 1.25; 95% CI = 1.01, 1.55). While serous and endometrioid cancer were associated with talcum powder products use, no association was seen with mucinous or clear cell cancers. The review authors concluded, from the data, that perineal talcum powder use and ovarian cancer were consistently associated, with a slightly higher risk in women who report greater usage. Some variation in the magnitude of the effect of talcum powder products was found when considering the study designs and ovarian cancer subtypes. Several small methodological issues are that Penniniklampi may have included some groups of patients more than once in analyses and did not include updated data or previously unpublished data available from a research consortium on ovarian cancer. However, these concerns are unlikely to have had a significant impact on their estimates.

Table 3. List of Included Studies, sorted by study design

	Study Type	Year	Author	Journal	Title
1	Cohort Study	2000	Gerting	J Natl Cancer Inst	Prospective study of talc use and ovarian cancer (in the Nurses' Health Study)
2	Cohort Study	2010	Gates	Am J Epidemiol	Risk factors for epithelial ovarian cancer by histologic type; US Nurses Health Study
3	Cohort Study	2014	Houghton	J Natl Cancer Inst	Perineal powder use and risk of ovarian cancer: Results from the Women's Health Initiative
4	Cohort Study	2016	Gonzalez	Epidemiology	Douching, talc use and risk of ovarian cancer: Results from the Sister Study
5	Systematic Rev.	1992	Harlow	Obst Gyn	Perineal exposure to talc and ovarian cancer risk
6	Systematic Rev.	1995	Gross	J Expo Anal Env Epid	A meta-analytical approach examining the potential relationship between talc exposure and ovarian cancer
7	Systematic Rev.	2003	Huncharek	Anticancer Res	Perineal application of cosmetic talc and risk of invasive epithelial ovarian cancer: a meta-analysis of 11,933 subjects from sixteen observational studies
8	Systematic Rev.	2007	Huncharek	Eur J Cancer Prev	Use of cosmetic talc on contraceptive diaphragms and risk of ovarian cancer: a meta-analysis of nine observational studies.
9	Systematic Rev.	2008	Langseth	J Epid Community Health	Perineal use of talc and risk of ovarian cancer.
10	Systematic Rev.	2010	IARC	IARC Monographs	IARC monographs on the evaluation of carcinogenic risks to humans: Carbon black, titanium dioxide, and talc
11	Systematic Rev.	2017	Berg	European J of Can Prev	Genital use of talc and risk of ovarian cancer: A meta-analysis
12	Systematic Rev.	2018	Penninkilampi	Epidemiology	Perineal talc use and ovarian cancer: A systematic review and meta-analysis.
13	Pooled Data	2013	Terry	Cancer Prev Res	Genital powder use and risk of ovarian cancer: a pooled analysis of 8525 cases and 9859 controls
14	Pooled Data	2016	Cramer	Epidemiology	The association between talc use and ovarian cancer- A retrospective case- control study two US states
15	Case-Control	1982	Cramer	Cancer	Ovarian cancer and talc: A case control study
16	Case-Control	1983	Hartge	JAMA	Talc and ovarian cancer
17	Case-Control	1988	Whittemore	Am J Epidemiol	Personal and environmental characteristics related to epithelial ovarian cancer. Exposure to talcum powder, tobacco, alcohol, and coffee
5	Case-Control	1989	Harlow	Am J Epidemiol	A case-control study of borderline ovarian tumors: The influence of perineal exposure to talc
18	Case-Control	1989	Booth	BR Cancer	Risk factors for ovarian cancer: a case-control study
19	Case-Control	1992	Harlow	Obstet Gynecol	Perineal exposure to talc and ovarian cancer risk
20	Case-Control	1992	Rosenblatt	Gynecol Oncol	Mineral fiber exposure and the development of ovarian cancer
21	Case-Control	1992	Chen	Int J Epidemiol	Risk factors for epithelial ovarian cancer in Beijing, China
22	Case-Control	1993	Tzonous	Int J Cancer	Hair dyes, analgesics, tranquilizers and perineal talc application as risk factors for ovarian cancer
23	Case-Control	1995	Purdie	Int J Cancer	Reproductive and other factors and risk of epithelial ovarian cancer: an Australian case-control study
24	Case-Control	1996	Shushan	Fertil Steril	Human menopausal gonadotropin and the risk of epithelial ovarian cancer
25	Case-Control	1997	Chang	Cancer	Perineal talc exposure and risk of ovarian carcinoma
26	Case-Control	1997	Cook	Am J Epidemiol	Perineal powder exposure and the risk of ovarian cancer
27	Case-Control	1998	Green	Int J Cancer	Tubal sterilization, hysterectomy and decreased risk of ovarian cancer.
28	Case-Control	1998	Godard	Am J Obstet Gynecol	Risk factors for familial and sporadic ovarian cancer among French Canadians: A case-control study
29	Case-Control	1999	Cramer	International J of Cancer	Genital talc exposure and risk of ovarian cancer
30	Case-Control	1999	Wong	Obstet Gynecol	Perineal talc exposure and subsequent epithelial ovarian cancer: A case-control study
31	Case-Control	2000	Ness	Epidemiol	Factors related to inflammation of the ovarian epithelium and risk of ovarian cancer
32	Case-Control	2004	Pike	Fertil Steril	Hormonal factors and the risk of invasive ovarian cancer: A population based case control study
33	Case-Control	2004	Mills	Am J Epidemiol	Perineal talc exposure and epithelial ovarian cancer risk in the Central Valley of California
34	Case-Control	2008	Goodman	Endocr Relat Cancer	Association of two common single-nucleotide polymorphisms in the CYP19A1 locus and ovarian cancer risk
35	Case-Control	2008	Gates	Cancer Epid Bio Prev	Talc use, variants of the GSTM1, GSTT1, and NAT2 genes, and risk of epithelial ovarian cancer
36	Case-Control	2008	Merritt	Int J Cancer	Talcum powder, chronic pelvic inflammation and NSAIDs in relation to risk of epithelial ovarian cancer
37	Case-Control	2009	Moorman	Am J Epidemiol	Ovarian cancer risk factors in African-American and white women
38	Case-Control	2009	Wu	Int J Cancer	Markers of inflammation and risk of ovarian cancer in Los Angeles County
39	Case-Control	2011	Rosenblatt	Gynecol Oncol	Mineral fiber exposure and the development of ovarian cancer
40	Case-Control	2012	Lo-Cignaia	Epidemiol	Aspirin, non-aspirin non-steroidal anti-inflammatory drugs, or acetaminophen and risk of ovarian cancer
41	Case-Control	2012	Kurta	Cancer Epid Bio Prev	Use of fertility drugs and risk of ovarian cancer: results from a U.S.-based case-control study
42	Case-Control	2015	Wu	Cancer Epid Bio Prev	African Americans and Hispanics remain at lower risk of ovarian cancer than non-Hispanic whites after considering nongenetic risk factors and oophorectomy rates
43	Case-Control	2016	Schildkraut	Cancer Epid Bio Prev	Association between body powder use and ovarian cancer: the African American Cancer epidemiology Study

Table 4. List of Included Studies with Number of Cancers, Controls, and Reported Odds Ratios

	Study Type	Year	Author	Cancers	Controls or Cohort Size	Odds Ratio	95% CI
1	Cohort Study	2000	Gerting	307	78,630	1.12	(0.82, 1.55)
2	Cohort Study	2010	Gates	797	108,073	1.06	(0.89, 1.28)
3	Cohort Study	2014	Houghton	427	61,576	1.12	(0.92, 1.36)
4	Cohort Study	2016	Gonzalez	154	41,654	0.73	(0.44, 1.2)
5	Systematic Review	1992	Harlow *	1,106	1,756	1.30	(1.1, 1.6)
6	Systematic Review	1995	Gross	1,333	2,362	1.29	(1.02, 1.63)
7	Systematic Review	2007	Huncharek	1,858	2,830	NA	NA
8	Systematic Review	2003	Huncharek	5,260	6,673	1.33	(1.16, 1.45)
9	Systematic Review	2008	Langseth			1.35	NA
10	Systematic Review	2010	IARC			1.30	
11	Systematic Review	2017	Berg	15,230	NR	1.22	(1.13, 1.30)
12	Systematic Review	2018	Penninkilampi	14,311	NR	1.31	1.24, 1.39
13	Pooled Data	2013	Terry	4,472	6,175	1.37	(1.19-1.58)
14	Pooled Data	2016	Cramer	2,041	2,100	1.38	(1.01, 1.99)
15	Case-Control Study	1982	Cramer	215	215	1.58	(0.98, 2.47)
16	Case-Control Study	1983	Hartge	135	171	2.50	(0.70, 10.0)
17	Case-Control Study	1988	Whittemoore	188	539	1.45	(0.94, 2.22)
5	Case-Control Study	1989	Harlow	116	158	1.10	(0.70, 2.1)
18	Case-Control Study	1989	Booth	235	451	1.30	(0.80, 1.9)
19	Case-Control Study	1992	Harlow	235	239	1.80	(1.1, 3.0)
20	Case-Control Study	1992	Rosenblatt	77	46	1.70	(.70, 3.9)
21	Case-Control Study	1992	Chen	112	224	3.90	(0.9, 10.6)
22	Case-Control Study	1993	Tzonous	189	200	1.05	(.28, 3.98)
23	Case-Control Study	1995	Purdie	824	860	1.27	(1.04, 1.54)
24	Case-Control Study	1996	Shushan **	200	408	2.00	NA
25	Case-Control Study	1997	Chang	367	564	1.51	(1.13, 2.02)
26	Case-Control Study	1997	Cook	313	422	1.60	(0.9, 2.9)
27	Case-Control Study	1998	Green	824	855	1.30	(1.1, 1.6)
28	Case-Control Study	1998	Godard	170	170	2.49	(0.94, 6.56)
29	Case-Control Study	1999	Cramer	563	523	1.60	(1.18, 2.15)
30	Case-Control Study	1999	Wong***	499	755	1.13	(0.89, 1.43)
31	Case-Control Study	2000	Ness	767	1,367	1.50	(1.1, 2.0)
32	Case-Control Study	2004	Pike				
33	Case-Control Study	2004	Mills	256	1,122	1.74	(1.14, 2.64)
34	Case-Control Study	2008	Goodman	367	602	0.99	(.70, 1.41)
35	Case-Control Study	2008	Gates			1.41	(1.14, 1.76)
36	Case-Control Study	2008	Merritt	1,576	1,509	1.34	(1.06, 1.68)
37	Case-Control Study	2009	Moorman	1,086	1,057	1.37	(1.05, 1.80)
38	Case-Control Study	2009	Wu	609	688	2.08	((1.34 3.23)
39	Case-Control Study	2011	Rosenblatt	812	1,313	1.13	(0.93, 1.36)
40	Case-Control Study	2012	Lo-Cignaie	902	1,802	1.34	(1.07, 1.66)
41	Case-Control Study	2012	Kurta	902	1,802	1.41	(1.16, 1.69)
42	Case-Control Study	2015	Wu	1,701	2,391	1.46	(1.27, 1.69)
43	Case-Control Study	2016	Schildkraut	584	745	1.71	(1.26, 2.33)

Odds ratio, likelihood (odds) that an outcome will occur because of a particular exposure compared to the likelihood it will occur without the exposure. 95% CI, 95% confidence interval, a measure of statistical uncertainty that says with about 95% of the time that the true value is within the range of numbers. The wider the range, the higher the uncertainty. NR, not reported.

* crude unadjusted estimate

** approximate, unadjusted estimate

*** assessed perineal or thigh use, and controls all have cancer

Berge (2018) ⁶⁸

This large, comprehensive systematic review of the association between genital use of talc powder products and ovarian cancer also had well-described methods. Berge reviewed and abstracted data for 27 publications and reported an overall summary estimate of the association between talc exposure and ovarian cancer. For six of the reviewed studies, Berge included data published in a pooled data analysis, from Terry ⁶⁹ described below) that had not been previously included in the original publications. Overall, data on 15,230 women with ovarian cancer were analyzed (a number that is incorrectly reported in the paper). This is slightly higher than the number included in Penninkilampi because of the additional patients from the Terry publication. The summary estimate for risk of ovarian cancer for women who ever used genital talc was RR 1.22 (95% CI 1.13, 1.30). When stratified by histologic type, serous carcinoma was the only type with a significant association to talc use (RR 1.24, 95% CI 1.15, 1.34). There was no difference in risk when tumors were categorized as invasive versus borderline.

To assess relationships among ovarian cancer and intensity and duration of use, these measures were analyzed separately rather than as a combined measure that would give an estimate of the total number of exposures; the analyses did not demonstrate a significant dose response. Importantly, these measures were assessed only in five studies with the results on frequency of use presented as increased risk per additional day per week of talc use, which assumes a very linear association. I was not able to identify the original studies used in the review that reported the results with this level of granularity. Because of the small number of studies, the results (3% increase in risk per additional day of talc used, with high statistical uncertainty) were not surprising.

The authors also stratified the results by the study design (as did Penninkilampi) and found that the association between talc exposure and ovarian cancer was significant only for the case-control studies, although, as above, the cohort studies had the weakest definition of exposure. The primary limitation of the review is defining exposure as ever having used talc. As described above, this is a broad, vague definition that probably dilutes any estimated association, as it includes both women with trivial use and with regular use. A second limitation is that the included studies adjusted for a variety of covariates although this is unavoidable in this type of summary. The large difference in general between adjusted and crude results emphasizes the importance of adjustments when estimating particular risk.

Langseth (2008) ⁷⁰

This systematic review of the association between genital use of talc powder products and ovarian cancer included 21 publications. The overall pooled odds of cancer were OR 1.35 across all studies. Several authors of this systematic review were involved in an IARC report on talc exposure. They analyzed a subset of eight studies used in the IARC report that were considered to be the most informative for estimating ovarian cancer risk. Analysis of these more relevant, higher quality studies, produced an increased ovarian cancer risk of 30 to 60% (presumably OR 1.3–1.6) associated with talcum powder use. This subset analysis did not document a dose response or assess associations by cancer types.

Huncharek (2007) ⁷¹

Huncharek summarized the results of nine studies that reported on the association between talc used on contraceptive diaphragms and ovarian cancer. No data on perineal talc exposure were analyzed and the data are not included herein. Of note, the reported methodological details suggest a very poorly designed and conducted study. Some of the included papers do not even mention talcum powder products used with diaphragms. This systematic review is poor quality.

IARC (2006) ⁶²

Beginning in 1969 the International Agency for Research on Cancer (IARC) began a program to critically review the data on the carcinogenic risk of chemicals to humans. They subsequently expanded their reviews to include evaluation of carcinogenic risks associated with a range of exposures (including risks associated with biological and physical agents, lifestyle factors, complex mixtures of exposures, occupations, etc.) The purpose of the IARC program is to elaborate and publish detailed monographs including critical review of data, to evaluate human risks, and to indicate where uncertainty exists and where additional data are needed. They also give an overall assessment of the strength of the associations. It is worth noting that the individuals who contribute to IARC reports (the Working Group) include extremely knowledgeable and unbiased scientists who have specific content expertise and who have no apparent conflicts of interest. Invited specialists and representatives from international health agencies are brought in to supplement the scientific experts. In their evaluation, they heavily weight whether data support a conclusion of causality. They score evidenced into four categories, ranging from a) evidenced suggesting lack of carcinogenicity; b) inadequate evidence of carcinogenicity c) limited evidence of carcinogenicity and d) sufficient evidence of carcinogenicity. Category c is used when there is possibly carcinogenicity, and this category is not used lightly. An exposure meets category c if there is a positive association between observed exposure to the agent and cancer for which a causal interpretation is considered by the Working Group to be credible, but chance of bias or confounding could not be ruled out. They further categorize agents into 3 groups: Group 1, corresponding to d above (sufficient evidence), the agent is carcinogenic to humans; Group 2, which includes 2A (the agent is probably carcinogenic) and 2B: the agent is possibly carcinogenic to humans. A review focused on the risks associated with carbon black, titanium oxide and talc was published in 2006. The review included a detailed review of the individual studies examining perineal talc use as a risk factor for cancer. IARC concluded that perineal use of talc-based body powder is possibly carcinogenic to humans (Group 2B)

Huncharek (2003) ⁷²

This review of 16 studies assessed the relationship between genital exposure to talc and ovarian cancer using data for 5260 women with cancer and 6673 controls. The pooled OR for ever being exposed to perineal talc powder products was 1.33 (95% CI 1.16, 1.45). Small differences were observed in the estimated ORs by whether controls in the case-control studies were from hospital populations (OR 1.19, 95% CI 0.99, 1.4), or the general population (OR 1.38, 95% CI 1.25, 1.52). I believe these differences are small. In general, in case-control

studies, population controls are likely more relevant and valid. However, as with several of the other reviews, talcum powder exposure was assessed as any exposure rather than quantifying by intensity. No stratification by tumor subtype or invasiveness was performed.

Gross (1995) ⁷³

Gross reviewed 10 studies on the association between talc exposure and ovarian cancer using data on 1333 women with cancer and 2362 without cancer. To summarize the RR of malignant epithelial cancer types due to any exposure to talc, adjusting for ovarian cancer risk factors, the authors combined results from five studies for OR 1.29 (95% CI 1.02, 1.63). For an analysis of all cancers (borderline and invasive), they included data from seven studies for a similar OR of 1.31 (95% CI 1.08, 1.58). Notably, the authors did not provide any methodological details of how they identified, assessed, and combined studies, making the results difficult to fully interpret. As with several of the other reviews, they assessed any exposure to talc.

Harlow (1992) ⁷⁴

Harlow reviewed five previously published studies and summarized an OR, not adjusted for confounding factors, and added his own data for a crude estimated OR of 1.3 (95% CI 1.1, 1.6). Unfortunately, no methodological details were provided on how studies were identified, assessed, and combined or how exposure was defined, making the results difficult to fully interpret. Further, only the combined, estimated, non-adjusted crude OR was reported. Of note, the results of the five published studies used in the review (in contrast to the summary) are well described and of good methodological quality.

Systematic Reviews: Summary

The systematic reviews provide a remarkably consistent estimate of an approximately 30% increase in the risk of ovarian cancer associated with any talc powder products use. The studies summarized in the systematic reviews reported consistent results with little variability and closely overlapping estimates for ovarian cancer risk due to talc use. Further, the reviews suggest that the risks are greater for invasive serous cancer. I believe Penninkilampi provides a comprehensive and high quality review and his estimate is that women who regularly use talc powder products, defined as >3600 lifetime applications, have a 40% increased risk of ovarian cancer compared to women with no regular talc powder product use. The association was significant for serous cancers.

While the methodological approaches of these systematic reviews were generally valid, I believe they all shared the weakness of focusing on any talcum powder use rather than daily talcum powder use, and this motivated my own review (below).

Pooled Data

Two large studies pooled data from several studies. They are worth describing because of their larger sample size and strong methodology in comparison to the individual case-control studies.

Pooled Data 1: Terry (2013)⁶⁹

This report pooled data on ovarian cancer patients from a national research consortium and assessed the relationship between talc powder products exposure and ovarian cancer by histologic subtype and invasiveness. Data were from eight case-controlled studies and importantly included previously unpublished data. The authors tried to unify definitions across the studies, but the definitions nonetheless varied widely. The prevalence of genital powder use in the controls varied widely across participating study sites, ranging from 15%–45%, suggesting either large variations in the underlying populations or, probably more likely, variation in the definition of powder use that led to these differences.

The data were for a total of 8525 cases and 9859 controls in the primary analysis. The authors found that **genital talcum powder use was associated with an approximately 24% increased risk of epithelial ovarian cancer (OR 1.24, 95% CI 1.15, 1.33)**. When stratified by cancer type, the risk was increased for all cancers except mucinous cancer. Risks were approximately equally elevated for invasive and borderline tumors. They used a subset of patient data to determine RR of ovarian cancer for the highest talcum powder users, measured as cumulative lifetime perineal applications (defined as applications per month and months of the year). They also considered age (inclusion in the highest user group required more use at age 70 than age 40) and assessed risk of cancer among the highest users. **The odds of cancer in the highest talc exposure category was higher than for women who ever used talc (OR 1.37, 95% CI 1.19, 1.58)**. A significant dose response was seen when data on all patients were analyzed, with greater exposure leading to greater risk.

Pooled Data 2: Cramer (2016)⁷⁵

Cramer conducted several case-control studies on the relationship between genital talc powder use and ovarian cancer. He pooled data from a large number of these studies, described as reflecting study enrollment in 1992–1997, 1998–2002, and 2003–2008. This publication reports the analysis of pooled data from these separate enrollment phases and a more detailed characterization of those data. Cases were women who resided in Eastern Massachusetts and New Hampshire diagnosed with epithelial ovarian cancer between the ages of 18 and 80. Controls were women identified through random-digit dialing, driver's license lists and town resident lists. Women were interviewed in person, and details of talc use were elicited including the number of applications per month (allowing assessment of frequency of use), timing of use, and lifetime exposures. These descriptions gave far greater detail than most other reports and are thus an important contribution to the field. Further, more demographic and clinical history were obtained and described in these enrollments than for other reviewed studies. This report gave associations from pooled data for 2041 cases and 2100 controls. The larger size of the population, unified variables, and greater detail about cases and controls allowed a larger number of stratifications than other studies.

Overall, genital talc use was associated with an OR of 1.33 (95% CI 1.1.6, 1.52). An important observation was that risk decreased with time since last use. Thus, how often women regularly used talcum powder (daily, or weekly or monthly) was meaningful for predicting ovarian cancer risk, but not if the women had not used talcum powder for 5 or more years.

Women who reported using talcum powder daily (>30 applications per month) had an OR of 1.46 (95% CI 1.2, 1.78). Of note, among women in the ovarian cancer case group who used talcum powder, daily was the most commonly reported frequency of use. **When analysis used data on women who reported their total number of talcum powder applications, those in the highest group category (>7200 lifetime applications, the equivalent of 20 years of daily application) had an OR for ovarian cancer of 1.49 (95% CI 1.06, 2.1).**

Cramer conducted detailed analysis of factors that could influence/interact with the association between talcum powder and ovarian cancer. Some of the results are quite striking. First, a very strong interaction with race was noted. **African-American women seem to be at a particularly elevated risk of ovarian cancer following talcum powder exposure (OR 5.08, 95% CI 1.32, 19.6) compared with white women (OR 1.35, 95% CI 1.17, 1.55).** This finding calls for greater research given the higher incidence, and poorer outcomes among African American women. Asian women seem to be at reduced risk (OR 0.04, 95% CI 0.01, 0.34). **Analysis showed a strong relationship with menopausal status and use of hormone replacement therapy.** ORs were significantly increased in premenopausal women (OR 1.41, 95% CI 1.13, 1.75) and **postmenopausal women who used hormone treatment (OR 2.21, 95% CI 1.63, 3.0).** Postmenopausal women who did not use hormone therapy were not at increased risk of ovarian cancer (OR 1.0, 0.68, 1.49). **Interestingly, the risk of ovarian cancer among postmenopausal hormone-treatment users was elevated only if they used hormones before hysterectomy and tubal ligation but risk was substantial (OR 3.49, 95% CI 1.39, 8.75) if talcum powder was used before these surgeries (OR 5.85, 95% CI 2.89, 11.9) compared to talcum powder use both before and after surgery.**

These findings merit further assessment in other populations but raise the possibility that estrogen is important in ovarian carcinogenesis. The authors also stratified analyses by histologic type and found that the relationship between ovarian cancer and frequency of talcum powder use was significantly elevated for invasive and borderline serous cancer and invasive endometrioid cancer, but not for mucinous, clear cell or mucinous borderline cancer. **Among the most frequent users of talc the adjusted OR for invasive serous cancer is 1.54 (95% CI 1.15, 2.07).** This relationship was even stronger among premenopausal women (OR 1.85, 95% CI 1.21, 2.8) compared to postmenopausal women (OR 1.33, 95% CI 0.96, 1.85).

Pooled Data of Case-Control Studies: Summary

The increased risk of ovarian cancer associated with talc use was estimated at around 40% across these studies. The increased risk for serous cancer was even higher at 50%.

Case-Control Trials

A large number of case-control studies are published—too many to dedicate a paragraph to summarizing the methods of each.

21,24,36,40,74,76-99

I carefully read and abstracted data from each study. Without assessing the quality of the case-control studies, I included them in a table and sorted them by size of the reported effect

of talc on ovarian cancer risk. It's a way to get an overview of what they report – and Viewing them in this way is easy to see the general direction of the effect. All but two demonstrate a positive association ($OR > 1$) between any talc powder products use and ovarian cancer, with ORs ranging from 0.73–3.9 across studies, Table 5 .

Table 5: List of Case-Control Studies Sorted by Estimated Effect Size (Odds Ratio)

Year	First author			Odds ratio	Confidence interval
	2008	Goodman	367	602	0.99 (.70, 1.41)
1993	Tzonous	189	200	1.05	(.28, 3.98)
1989	Harlow	116	158	1.10	(0.70,2.1)
1999	Wong*	499	755	1.13	(0.89, 1.43)
2011	Rosenblatt	812	1313	1.13	(0.93,1.36)
1995	Purdie	824	860	1.27	(1.04, 1.54)
1989	Booth	235	451	1.30	(0.80,1.9)
1998	Green	824	855	1.30	(1.1, 1.6)
2008	Merritt	1576	1509	1.34	(1.06, 1.68)
2012	Lo-Cignaia	902	1802	1.34	(1.07,1.66)
2009	Moorman	1086	1057	1.37	(1.05, 1.80)
2008	Gates			1.41	(1.14, 1.76)
2012	Kurta	902	1802	1.41	(1.16, 1.69)
1988	Whittemore	188	539	1.45	(0.94, 2.22)
2015	Wu	1701	2391	1.46	(1.27,1.69)
2000	Ness	767	1367	1.50	(1.1, 2.0)
1997	Chang	367	564	1.51	(1.13,2.02)
1982	Cramer	215	215	1.58	(0.98, 2.47)
1997	Cook	313	422	1.60	(0.9, 2.9)
1999	Cramer	563	523	1.60	(1.18, 2.15)
1992	Rosenblatt	77	46	1.70	(.70, 3.9)
2016	Schildkraut	584	745	1.71	(1.26, 2.33)
2004	Mills	256	1122	1.74	(1.14, 2.64)
1992	Harlow	235	239	1.80	(1.1, 3.0)
1996	Shushan **	200	408	2.00	NA
2009	Wu	609	688	2.08	((1.34 3.23)
1998	Godard	170	170	2.49	(0.94,6.56)
1983	Hartge	135	171	2.50	(0.70, 10.0)
1992	Chen	112	224	3.90	(0.9,10.6)
2004	Pike			NA	

V. Rationale for and Explanation of the New Systematic Review

In previous systematic reviews that I have conducted, I have obtained the most meaningful and consistent results by narrowly defining the research topic of the review, including only studies that provide data on this narrow topic in a well-defined population and stratifying my analysis of the studies' results by relevant factors such as age or race/ethnicity. The benefit of this approach is more accurate, precise, and meaningful results, while the potential tradeoff is a reduction in general applicability of the results, because many studies may be excluded for inadequate data. I believe greater accuracy is more important because I want to be certain about the data I am describing. For example, when I conducted a systematic review on the use of transvaginal ultrasound as a diagnostic test for endometrial cancer, I initially stratified

the results by patient use of hormone therapy. The reviewed studies had consistent results, but only if profoundly different diagnostic criteria were applied for women who did and did not use hormone therapy. For this reason, I completed one review on hormone users and another on non-users. In this case, I had sufficient data to assess both groups.

In this review on talcum powder use, I had sufficient data to summarize results for regular users of talcum powder (as close to daily but reflecting use of talc powder products several times per week) and risks of serous cancer; I did not have sufficient data to summarize results for occasional users or risk of other cancer types. I believe the most important research question to answer in this review is whether regular exposure to talcum powder is associated with ovarian cancer. I want to point out that this does not mean that other uses (i.e. less than approximate daily use) does not cause ovarian cancer, nor that talc powder products does not cause other types types of ovarian cancer (e.g. endometrioid cancer). Thus, for the systematic review below of case-control studies on the relationship between perineal exposure to talcum powder products and ovarian cancer, I focused on whether regular use of perineal (genital) talc increases the risk of the ovarian cancer. When possible, I focused on the most common and serious type, invasive serous ovarian cancer.

VI. New Systematic Review of Literature Quantifying Association Between Regular Frequent Genital (Perineal) Talcum Powder Products Application and Ovarian Epithelial Cancer Risk with A Focus on Invasive Serous Cancer.

Literature Search

I performed a literature search to identify primary research studies (not reviews) that included patient-level data on the association between talc and ovarian cancer. The literature search was performed in the Medline, Embase, and Scopus databases using keywords “ovarian cancer,” “talc,” “perineal powder” and “genital powder.” Abstracts of resulting publications were reviewed to identify if they addressed the topic and included data. Only English-language articles were reviewed. The references of identified articles and reviews were scanned to identify additional publications. Review articles, editorials, letters to the editor were excluded.

Article Selection

Articles were included based on relevance to the question: **Does the regular (as close to approximately daily) use of genital (perineal) talcum powder increase invasive epithelial ovarian cancer?** Because daily use was the most dominant use category, when studies stratified their results into quartiles of use, or lifetime applications, I included the highest use category that had a reasonable number of data points to reflect daily use. Wherever possible, data on invasive serous cancer were abstracted separately. When I found duplicate reports on the same patient group, the largest and most detailed publication was included. This usually meant the most recent publication, but not always. An important caveat is that I could not always identify duplicative results. I included data from the Terry 2013 pooled data study because it included new data from previous studies. I also included data from the Cramer

2016 pooled analysis and earlier publications with duplicative patients were not included. But I calculated the results both including and excluding these studies.

Exclusion

Studies were not included if they reported only crude ORs unadjusted for confounding factors. A few studies were excluded because, the research methods were poorly defined, even though they reported on women who frequently used talcum powder. Studies that asked participants a single question about ever use of talcum powder, without further quantification of exposure, were not included in the summary.

Defining Talcum Powder Products Use

Regular use was defined ideally as daily or at least more than 3 uses per week. I also accepted studies that defined use as “regular” where the description made it clear that this was regular use. Studies that reported “regular use” but defined it as use of less than this frequency, were not included. Regular use was selected to differentiate occasional use (which may include one-time or infrequent use or use during only a particular time of a woman’s menstrual cycle) from sustained regular use. Studies that asked participants a single question about ever use of talc, without further quantification of exposure, were not included in the summary. For example, Purdie reported that 52–57% of women reported ever using talc without further quantification and was not included. Several studies asked about *regular use* defined as at least once a month. These studies were not included unless they further characterized women into different categories of use; if so, I included data for women in the highest use category as long as this was group was large enough to be meaningful. When studies asked about ever use but defined use and stratified results by use, I included any data that may have reflected daily use. This measure of regular use is imprecise but is more accurate and meaningful than evaluating talcum powder exposure as any use.

Stratification of Analyses: Focus on a Single Histologic Type Where Possible

My review focused on invasive serous cancer where possible, but also included all invasive cancer. The decision to focus on a single histologic cancer type was in part because ovarian cancers include a broad range of types and association of talc and ovarian cancer might differ by type. I chose serous cancers because they are most common invasive ovarian cancer type. Importantly, serous ovarian cancer is the only histologic type for which most individual research studies accumulated sufficient cases for valid statistical analysis. This cancer type also has the least uncertainty in pathological diagnosis (see Section III, Histologic Types). Further and most importantly, serous ovarian cancer is the most aggressive histologic type, so identifying causal factors is important. Finally, I focused on invasive cancer (as opposed to borderline cancer) because the risk of death from invasive serous tumors is far higher than for noninvasive types, with growing consensus that borderline tumors may not be malignant.

Type of Exposures

Studies were included if they reported on perineal exposure (rather than exposure through sanitary napkins, diaphragms, or condoms) as this is the most common exposure type and is

likely to reflect the most consistent exposure. I did not exclude studies if they reported combined use, as long as the exposure included perineal use.

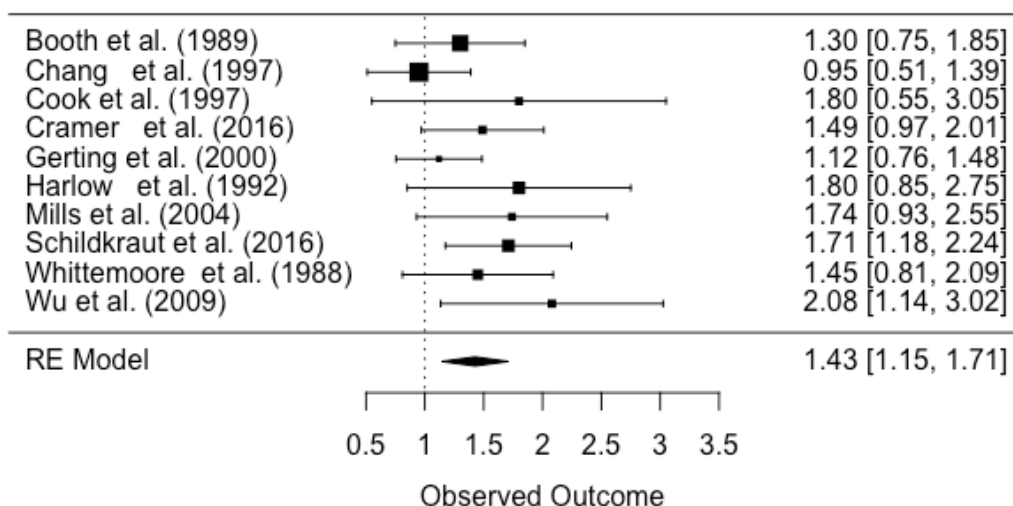
Statistical Analysis

Two individuals (Smith-Bindman and a consultant biostatistician) reviewed an abstracted data from each publication. Differences were resolved by consensus. The focus of the review was on quantifying the association between regular talcum powder products use and ovarian cancer, with a sub analysis on serous cancer and invasive cancer. Meta-analysis was performed using the metafor package in R (Version 3.5.1). The rma function was used to apply linear mixed effects models to study results and calculate summary statistics on effect size. Due to varying amounts and types of available data from each included publication, adjusted odds ratios (OR) and standard errors were used as the model inputs. Standard error (SE) was estimated using the relationship: 95% confidence interval = Effect size \pm 1.96*SE, assuming a roughly normal distribution of data and roughly symmetrical upper and lower confidence interval bounds. Incorporating adjusted ORs and SE into models in this way provides the added benefit of allowing model use of covariate-adjusted data (versus crude OR data). Weighting was done based on estimates of inverse variance. Study result heterogeneity was estimated based on maximum likelihood methods and was summarized via an I² statistic and associated p-value. The decision to include results from the cohort study by Gertig and colleagues (2000), which reported relative risk (RR), was based on the estimation that the RR value was only nominally different from the OR, a safe assumption in a study sample where less than 0.4% of the cohort developed the condition-of-interest.

Results

Overall 10 studies reported on daily talc powder products use and the risk of ovarian cancer. These studies were homogenous, and the odds of ovarian cancer associated with regular use was 1.43 (95% CI 1.15 1.71). The included studies with associated point estimates are shown in a Forrest Plot in Figure 2

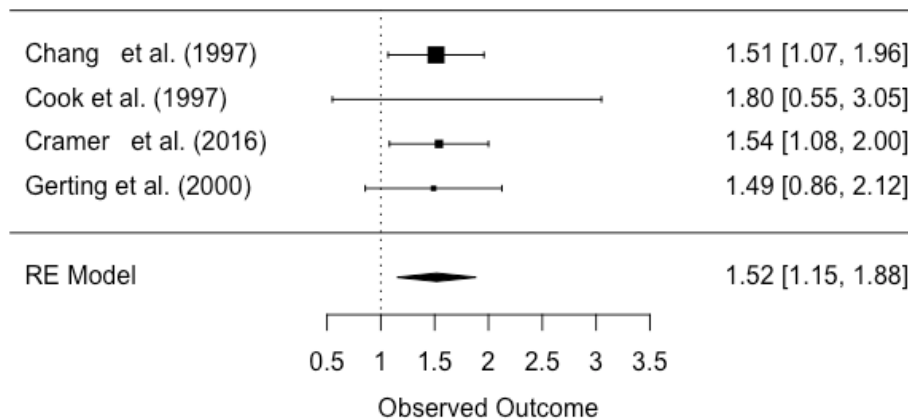
Figure 2. Forrest plot showing odds of ovarian cancer associated with regular use of talcum powder products.



The primary analysis of this excluded Terry, but the results were nearly identical if Terry was included

There were studies reported on regular talcum powder use and invasive serous cancer (or all invasive cancer if serous not reported) These studies were homogenous. The odds of invasive serous cancer associated with regular use was 1.52 (95% CI 1.15, 1.88). The results were similar when assessing the odds of all serous cancer.

Figure 3 Forrest plot showing odds of ovarian cancer associated with regular use of talcum powder products and invasive serous cancer.



New Systematic Meta-Analytic Review: Summary

The results of my systematic review of case-control studies on talcum powder use and ovarian cancer risk were consistent and indicate a **50% increase in risk of serous invasive cancer related to routine talcum powder exposure compared to no exposure**. This review had limitations including that study results were self-reported. I tried to be consistent in defining exposure, but this factor was subjectively determined by the individual studies. I tried to eliminate overlap of participant populations used in the included studies, but some patients may have contributed data to more than one study.

Overall Summary of the Epidemiology Data Describing the Association Between Talcum Powder Products and Serous Ovarian Cancer

I conclude, based on the review of the available primary studies, systematic reviews and my own quantitative review, that regular exposure to talcum powder products increases ovarian cancer risk by around 50%. The existing systematic reviews (in particular Penninkilampi and Berge) also concluded a significant increase in ovarian cancer risk following talcum powder exposure.

VII. Other Relevant Factors

Research Supporting Talcum Association with Ovarian Cancer: Transit to Ovary and Risk Reduction on Interruption

Evidence from relevant studies is clear that talcum powder particles applied to the genital region will ascend through the vagina and fallopian tubes and enter the pelvic cavity, reaching fallopian tubes and ovaries. In humans, this route has been established experimentally by labelling inert particles, applying them to the perineum just prior to planned hysterectomy, and then recovering them from the fallopian tubes following surgery. [Egli Fertil Stwriil 1961]

Further, talc particles have been found in normal and malignant ovarian tissue. Henderson found that in 10 of 13 tested epithelial ovarian cancer tumors, 75% had talc embedded in the tissue. This result confirms that talc reached to the areas with cancerous tissue, but not that it caused the cancer. Histological evaluation of ovaries removed because of ovarian cancer or benign conditions have identified both talc particles and asbestos fibers in the ovarian tissue, further supporting that particles applied to the perineum reach the ovaries.^{60,100} Heller found that in all women in a study who were having ovaries removed for benign ovarian growth had talc in their ovaries. These results confirm that talcum powder applied to the perineum may be absorbed into the vagina and migrate or be transported to the tubes and ovaries.¹⁰¹⁻¹⁰⁴ In 1967, Graham and Graham demonstrated that intraperitoneal application of asbestos in guinea pigs and rats results in overgrowth of ovarian epithelial cells comparable to the histologic changes in epithelial ovarian tumors in women. The greater frequency at which talc particles are discovered in ovarian cancerous tissue than in normal ovarian tissue further supports that these particles may be causing cancer.

Several epidemiological studies evaluated the risk of ovarian cancer associated with talcum powder products before and after women had tubal ligation or hysterectomy, which surgically removes the route by which talc reaches the ovaries. The studies strongly suggest that the increased risk of ovarian cancer associated with talcum powder products use is reduced or eliminated after tubal ligation or hysterectomy. The results support that the risk from talcum powder products is elevated when women have an open pathway from the perineum to the ovary that enables powder components to reach the ovaries via unobstructed fallopian tubes., The collective results demonstrate that talcum powder products are carcinogenic through direct transport/migration to the fallopian tubes and ovaries.

Variation in Risk when Talc Use is Discontinued

Several studies showed that the risk of ovarian cancer associated with talc powder products decreases as the time from discontinuation of powder use increases. For example, Cramer found an elevated risk of ovarian cancer with talc powder products use and the risk decreased as time since last use increased.⁷⁵

VIII. Consideration of Causality of Talc Powder Products and Ovarian Cancer : Bradford Hill Analysis

Causality is easiest to determine in studies such as randomized controlled trial, in which participants are randomized to receive or not receive a treatment, then their health is followed to see their response. However, people cannot ethically be randomized to be exposed to a potentially cancer-causing agent. Therefore, when assessing risk factors for cancer, the Bradford Hill Factors are often used. They provide a framework for assessing the weight of evidence to help decide if causality is likely, given a particular association, such as between talcum powder and ovarian cancer. The guidelines are imperfect and provide a framework as compared with an absolute set of criteria.

I address each of the Bradford Hill factors below, with my understanding of how the evidence of talcum powder products exposure supports or refutes causality. While the Bradford Hill Factors include nine aspects of association, they should not be used as a checklist for causation. Instead, they can help interpret associations and aid in inferring causality. For each factor, I have highlighted why I believe this factor is more or less important.

A) Strength of Association

It is frequently argued that the larger an apparent association, the more likely the association is to be real (causal) and important for epidemiological assessment. This would suggest that an OR of 2.0 is more likely to indicate causality and importance than an OR of 1.5. While this is often argued, I do not believe this is necessarily the case. If a risk factor increases the risk of disease by 50%, and the exposure is common, it will have a far greater impact on a number of people, in comparison to a rare exposure that has a higher associated OR. And if the association is truly one that increases risk by 50%, then this is the magnitude of the association that will be detected. It is not intuitive that if an exposure increases a risk by 50%, this difference is not discoverable compared with an exposure that increases risk by 100%. A larger association between exposure and disease may be easier to identify, but I do not believe it is more likely to indicate causality or importance.

As an example, Table 6 shows an overview of the relationship between bladder cancer and two of its known risk factors; occupational industrial chemicals and smoking. Several industrial chemicals such as 2-naphthylamine are strongly associated with bladder cancer risk. In 1954, Case et al. reported a 200-fold increased bladder cancer risk for workers exposed to 2-naphthylamine. In cohort studies of rubber industry workers, elevated standardized mortality ratios (SMRs) as high as 253 (95% CI 93, 551) were reported. Use of some of these chemicals are now prohibited in Europe and their use is regulated in the United States because they cause cancer.(OSHA, 2011).

Cigarette smoking is also a known bladder cancer risk factor. However, the RR for smoking and bladder cancer is around 3, and therefore about 100 times lower than the RR for exposure to industrial chemicals. Yet bladder cancer is the second most common cancer attributed to smoking in the United States. It impacts a very large number of individuals. Of the 70,000 cases of bladder cancer diagnosed each year, as many as 60% are estimated as attributable to smoking.

Using the RR magnitude to quantify the “importance” of these two risk factors, industrial chemicals and smoking, would be misleading. Smoking will result in far more cancers than industrial chemicals, even though the RR is much lower. In the crude data in Table 6, of the approximately 70,000 bladder cancers diagnosed annually in the United States, 50,000 are thought to result from cigarettes while fewer than 1000 result from occupational exposures. A 50% reduction in smoking exposure will save 25,000 men from getting bladder cancer. Reducing industrial chemical exposures will saving around 500 men from getting bladder cancer. Thus, any impact on reducing known exposures for bladder cancer has the potential to be around 50 times more impactful if directed at smoking.

Table 6. An example showing the number of individuals who might be impacted through exposure to an occupational chemical that leads to bladder cancer as opposed to smoking.

	Occupational Exposure	
	2-naphthylamine	Smoking
Estimated odds ratio associated with exposure	200	3
Number of individuals exposed annually	10,000	50,000,000
Bladder cancers due to exposure annually	1000	50,000
Impact on number of cancers diagnosed annual if exposure reduced by 50%	500	25,000

The bladder cancer example highlights that a factor that increases risk by 50% will have an enormous impact on population mortality if the exposure is common or if the cancer is particularly lethal. This is certainly the case for talcum powder products, which are used by as many as half of all women in the U.S. Women’s use of talcum powder products is so widespread that even a relatively modest increase in risk would pose a sizeable health risk to the population. Further, a 50% risk increase is particularly important for ovarian cancer, which has a high mortality rate, with rare early detection.

Defining a “strong” association is critical for assessing potentially causal relationships. A current concept in epidemiology is that considerations about whether a factor causes a disease should weigh statistical validity and significance and the multiple factors that influence the disease. Thus, assessing *strength of association* when inferring causality requires examining underlying research and analytic methods, comparing the weight of evidence in the literature, and considering other contextual factors. The data supporting the causality of talcum powder products exposure for ovarian cancer is extremely strong.

Using the existing evidence, I reviewed and assembled for this report, I estimated how many ovarian cancers that occur each year in the United States are likely to be caused by exposure to talcum powder products in comparison to other risk factors for ovarian cancer, Table 7. This is a relatively simple analysis, but nonetheless is informative. The total number of ovarian cancers that are estimated to occur in the US annually is 22,240, and these will occur among

the 50.8 percent of the U.S. population of 311 million who are women. Of these ovarian cancer cases, approximately half (11,120) will reflect invasive serous carcinoma. For the purpose of this simple analysis, I have assumed that the elevation in ovarian cancer risk associated with talcum powder product exposures occurs only with invasive serous carcinoma. This is not true, but the data are the most certain for these cancer and this is a conservative assumption (meaning the true number of cancer and proportion of cancers caused by talcum powder product users will be even higher than my calculation). A proportion of ovarian cancers will occur among women who regularly use talcum powder products, and the remainder will occur in women who do not regularly use talcum powder products. If we estimate that women who use talcum powder products regularly have a 50% elevated risk of invasive serious cancer and we estimate the number of women who are exposed to daily talcum powder products is between 10% and 30% (this proportion is fewer than ever users of talcum powder products), then between 1,589 and 4,351 women will be diagnosed each year with invasive serous cancer caused by the exposures, reflecting between 14% and 39% of all invasive serous cancers and reflecting between 7% - 20% of all ovarian cancer diagnosed each year. This is a tremendous risk. This is a very large number of cancers to be caused by a product that provides no medical benefit. This Bradford Hill Factor of the Strength of the association is important and is met.

Table 7 An estimate of the number of ovarian cancers and invasive serous cancers caused by regular use of perineal talc powder products.

Proportion of women who regularly use Talcum powder products	Annual Invasive Serous Cancer in Women Exposed to Talcum Powder Products	Annual Invasive Serous Cancer in Women Not Exposed to Talcum Powder Products	% Invasive Serous Cancer in Women Exposed to Talcum Powder Products	% of all ovarian Cancer in Women Exposed to Talcum Powder Products
10%	1,589	9,531	0.14	0.07
20%	3,033	8,087	0.27	0.14
30%	4,351	6,769	0.39	0.20

B) Consistency of Associations in Different Populations and Studies

Another consideration for association and causality is consistency of the data. The data on the association between genital talc and ovarian cancer are highly consistent. The relative stability in the estimated increase in the risk of ovarian cancer associated with talc powder products use (50% increase for regular users of talcum powder and serous cancers; around 40% increase for all epithelial ovarian cancer and regular users of talcum powder products), as assessed across time and in diverse populations with diverse study designs, strongly argues that the causal association is real and satisfies the Bradford Hill guideline for consistency of associations across populations and studies.

C) Specificity Between Cause and Effect

The Bradford Hill factors suggest that associations are more likely to be causal when an exposure causes only one disease. While some examples of highly specific exposures and outcomes exist, many exposures and health concerns involve complex chemical mixtures and low-dose environmental and occupational exposures complicated by a variety of personal risk factors. A recent review stated, "The original criterion of *specificity* is widely considered weak or irrelevant from an epidemiologic standpoint."¹⁰⁵ Asbestos, for example, is associated with a range of cancers and various exposures. Regardless of doubts about the meaningfulness of this factor, talcum powder products are primarily associated with ovarian cancer and thus fulfills the specificity consideration, although this consideration is not one of the most important considerations for causality in my expert opinion.

D) Temporality

An exposure must come before an outcome for the exposure to be causal. Bradford Hill explained that for an exposure-disease relationship to be causal, exposure must precede the onset of disease. While this is self-evident, in epidemiological studies, reverse causality, in which behavior related to a health issue is influenced by knowledge or events about the issue, is always a concern. For example, women who undergo ovarian cancer treatment may begin using talcum powder products during their pre- and post-operative period because of symptoms or side effects perceived to be alleviated by talcum powder products use. Assessing talcum powder use without specifying the time of use might lead to women with ovarian cancer being more likely to report talcum powder products use. In this example, talcum powder may not have caused the cancer; rather, use of talcum powder products was caused by the cancer (and treatments). The importance of this issue led to Bradford Hill's consideration of temporality when assessing causality.

In essentially all of the case-control studies that assessed use of talcum powder products, women were specifically asked to report talc powder products only during past, not current periods; thus, the studies explicitly assessed exposure to talcum before cancer. Typically, questions were phrased "Did you ever use talc, but not in the last year before cancer diagnosis?" to exclude the year prior to diagnosis. This issue is not relevant for the included cohort studies, as women were surveyed about their exposures prior to cancer ascertainment. Thus, the temporality consideration is important for my consideration and is satisfied.

E) Dose Response

In general, when risks are proportional to exposure (e.g., doubling exposure doubles risk) this dose-response evidence is considered to support causality. Many of the reviewed studies did not collect sufficient data to carefully quantify the dose response, and many limited their comparisons to an ever/never comparison. This is in part what motivated me to complete my separate quantitative review to at least be able to dis-entangle ever into regular versus not regular use. The reviewed studies that did provide data that could be used to assess the

potential for dose response had mixed results in quantifying dose response. While most studies showed evidence of a dose response, others did not. For example, Schildkraut showed that >20 years of any genital powder use (OR 1.51, 95% CI 1.11, 2.06) showed a stronger association with ovarian cancer than <20 years of use (OR 1.33, 95% CI 0.95, 1.86).⁹⁹ Terry and Harlow showed significant dose responses, where ORs increased as exposures increased.^{69,74} The adjusted ORs increased from 1.3, to 1.5 to 1.8 with <1000, 1000–10,000, and >10,000 lifetime applications. Overall, any exposure to talcum powder resulted in an OR of 1.5; direct perineal application had an OR of 1.7 (95% CI 1.1, 2.7), daily exposure had an OR of 1.8 (95% CI 1.1, 3.0) and women with an intact genital tract who were estimated to have had more than 10,000 applications during ovulating years had the highest risk (OR 2.8 95% CI 1.4, 5.4). This exposure was found in 14% of women with ovarian cancer. Penninkilampi⁶⁷, the most comprehensive of the systematic reviews, also showed a dose response where women with more than 3600 lifetime applications had slightly higher risks as did women who reported long-term (>10 years) talc use. In contrast, Whittemore⁷⁷ showed no dose response, and Booth⁷⁸ demonstrated the reverse—the higher the dose, the lower the risks. The data from reviewed studies were too diverse to summarize a dose-response relationship. The measures of exposure frequency and duration varied, and the studies used different thresholds for quantifying exposures. Further, the measures to quantify dose tended to be crude, making the response even more difficult to establish.

In summary, most but not all studies of talcum powder products and ovarian cancer show a dose response, but the results are inconsistent, and more importantly, are not considered or assessed in most of the published studies. A dose-response relationship is not required for causality and in large part because data were not consistently available, this factor does not weight heavily in my consideration. Further, this factor did not weight heavily in my considerations in that not all exposures will have a dose response, and some will indeed have a threshold effect. This is important here because asbestos is believed to exhibit a threshold, rather than a linear, dose-response.

F) Biologic Plausibility: Factors Linking Talc and Ovarian Cancer

The epidemiological evidence suggests a strong and positive association between exposure to talcum powder products and invasive ovarian cancer. However, epidemiological evidence alone does not provide a mechanism or pathophysiological process that accounts for the increased risk. Nor does the epidemiological evidence confirm the specific component or ingredient in talc powder products that is responsible for carcinogenesis. Nonetheless, the data are persuasive that particles contained in talcum powder reach the tubes and ovaries, inflammation initiate a causal pathway, and that several components of talc powder products including asbestos, asbestiform fibers in talc, and heavy metals can contribute to the carcinogenicity of the products. This was a strong factor in my consideration of the evidence because there is extremely strong evidence that the components of talc powder products are known to be highly carcinogenic in other settings.

G) Coherence and Consistency with Understood Biology

The guideline of coherence is considered similar to biological plausibility. For both, the cause-and-effect explanation should be consistent with all knowledge available. For talcum powder and ovarian cancer, this consideration is easily satisfied.

H) Experimental Evidence

The evidence in humans of the impact of talcum powder products exposure and ovarian cancer development is based on a large number of observational studies. Direct experimental evidence in the form of randomized controlled trials in humans is simply not possible to generate, for ethical reasons. The experimental evidence in humans that talc particles can migrate to the ovary and be incorporated into ovarian tissue is relevant to developing a causal model but does not directly prove that that exposure causes cancer. There is also human data relating to the inflammatory nature of ovarian cancer. There is compelling in vitro research delineating the inflammatory mechanism by which talcum powder causes cancer. Animal studies showing inflammatory tissue effects and tumor formation with talcum powder exposure are also supportive.

I) Analogy

Bradford Hill implied that when evidence is strong of a causal relationship between a risk factor and disease, researchers should be more accepting of weaker evidence that a similar risk factor may cause a similar disease. Thus, analogy has been interpreted to mean that when one causal agent is known, the standards of evidence are lowered for a second causal agent that is similar. The strong evidence for the association between asbestos and lung cancer, and the chemical similarity between these minerals, as well as their fibrous nature, supports the analogy consideration and causal inference.

Summary: Consideration of Causality of Talc Powder Products and Ovarian Cancer using Bradford Hill

In consideration of Bradford Hill, the clear strength of the association (A), remarkable consistency in the published literature across a large number of populations and research studies (B), temporality (D) considered in all of the published studies, and perhaps most importantly, biological plausibility (F) were the criteria that I considered of paramount importance when assessing the causality of exposures of talc powder products and epithelial ovarian cancer

IX. Conclusion

In conclusion, substantial evidence supports a strong, positive and causal association between ovarian cancer and genital exposure to talcum powder products. Regular exposure to talcum powder products causes ovarian cancer in some women. This opinion is based on my extensive review of the medical and scientific literature, my own independent meta-analysis of the data, and my experience and expertise in the areas of epidemiology and women's health, including ovarian cancer.

All opinions are made to a reasonable degree of medical and scientific certainty. I reserve the right to amend or supplement this report as new information becomes available.

References

1. Torre LA, Trabert B, DeSantis CE, et al. Ovarian cancer statistics, 2018. *CA Cancer J Clin*. 2018;68(4):284-296.
2. SEER Cancer Statistics Review, 1975-2015, National Cancer Institute, Bethesda, MD, https://seer.cancer.gov/csr/1975_2015/, based on November 2017 SEER data submission, posted to the SEER web site, April 2018. 2018.
3. Yang M, Li X, Chun-Hong P, Lin-Ping H. Pure mucinous breast carcinoma: a favorable subtype. *Breast Care (Basel)*. 2013;8(1):56-59.
4. Lee KR, Nucci MR. Ovarian mucinous and mixed epithelial carcinomas of mullerian (endocervical-like) type: a clinicopathologic analysis of four cases of an uncommon variant associated with endometriosis. *Int J Gynecol Pathol*. 2003;22(1):42-51.
5. Wentzensen N, Poole EM, Trabert B, et al. Ovarian Cancer Risk Factors by Histologic Subtype: An Analysis From the Ovarian Cancer Cohort Consortium. *Journal of clinical oncology : official journal of the American Society of Clinical Oncology*. 2016;34(24):2888-2898.
6. Bolton KL, Ganda C, Berchuck A, Pharaoh PD, Gayther SA. Role of common genetic variants in ovarian cancer susceptibility and outcome: progress to date from the Ovarian Cancer Association Consortium (OCAC). *Journal of internal medicine*. 2012;271(4):366-378.
7. Weissman SM, Weiss SM, Newlin AC. Genetic testing by cancer site: ovary. *Cancer journal (Sudbury, Mass)*. 2012;18(4):320-327.
8. Hunn J, Rodriguez GC. Ovarian cancer: etiology, risk factors, and epidemiology. *Clinical obstetrics and gynecology*. 2012;55(1):3-23.
9. Pal T, Akbari MR, Sun P, et al. Frequency of mutations in mismatch repair genes in a population-based study of women with ovarian cancer. *British journal of cancer*. 2012;107(10):1783-1790.
10. Gayther SA, Pharaoh PD. The inherited genetics of ovarian and endometrial cancer. *Current opinion in genetics & development*. 2010;20(3):231-238.
11. Lacey JV, Jr., Brinton LA, Leitzmann MF, et al. Menopausal hormone therapy and ovarian cancer risk in the National Institutes of Health-AARP Diet and Health Study Cohort. *Journal of the National Cancer Institute*. 2006;98(19):1397-1405.
12. Trabert B, Wentzensen N, Yang HP, et al. Ovarian cancer and menopausal hormone therapy in the NIH-AARP diet and health study. *British journal of cancer*. 2012;107(7):1181-1187.
13. Lahmann PH, Cust AE, Friedenreich CM, et al. Anthropometric measures and epithelial ovarian cancer risk in the European Prospective Investigation into Cancer and Nutrition. *International journal of cancer*. 2010;126(10):2404-2415.
14. Jordan SJ, Siskind V, A CG, Whiteman DC, Webb PM. Breastfeeding and risk of epithelial ovarian cancer. *Cancer causes & control : CCC*. 2010;21(1):109-116.
15. Garg PP, Kerlikowske K, Subak L, Grady D. Hormone replacement therapy and the risk of epithelial ovarian carcinoma: a meta-analysis. *Obstetrics and gynecology*. 1998;92(3):472-479.
16. Lacey JV, Jr., Mink PJ, Lubin JH, et al. Menopausal hormone replacement therapy and risk of ovarian cancer. *Jama*. 2002;288(3):334-341.

17. Seidman JD RP, Kurman RJ. . Surface epithelial tumors of the ovary. In: Kurman RJ, ed. Blaustein's Pathology of the Female Genital Tract. 5th ed. New York: Springer-Verlag; 2002:791–904.
18. Faber MT, Jensen A, Frederiksen K, et al. Oral contraceptive use and impact of cumulative intake of estrogen and progestin on risk of ovarian cancer. *Cancer causes & control : CCC*. 2013;24(12):2197-2206.
19. Faber MT, Kjaer SK, Dehlendorff C, et al. Cigarette smoking and risk of ovarian cancer: a pooled analysis of 21 case-control studies. *Cancer causes & control : CCC*. 2013;24(5):989-1004.
20. Risch HA, Marrett LD, Jain M, Howe GR. Differences in risk factors for epithelial ovarian cancer by histologic type. Results of a case-control study. *American journal of epidemiology*. 1996;144(4):363-372.
21. Purdie D, Green A, Bain C, et al. Reproductive and other factors and risk of epithelial ovarian cancer: an Australian case-control study. Survey of Women's Health Study Group. *International journal of cancer*. 1995;62(6):678-684.
22. Purdie DM, Bain CJ, Siskind V, Webb PM, Green AC. Ovulation and risk of epithelial ovarian cancer. *International journal of cancer*. 2003;104(2):228-232.
23. Kurian AW, Balise RR, McGuire V, Whittemore AS. Histologic types of epithelial ovarian cancer: have they different risk factors? *Gynecologic oncology*. 2005;96(2):520-530.
24. Gates MA, Rosner BA, Hecht JL, Tworoger SS. Risk factors for epithelial ovarian cancer by histologic subtype. *American journal of epidemiology*. 2010;171(1):45-53.
25. Gilks CB. Molecular abnormalities in ovarian cancer subtypes other than high-grade serous carcinoma. *Journal of oncology*. 2010;2010:740968.
26. Balkwill F, Mantovani A. Inflammation and cancer: back to Virchow? *Lancet (London, England)*. 2001;357(9255):539-545.
27. Coussens LM, Werb Z. Inflammation and cancer. *Nature*. 2002;420(6917):860-867.
28. Crusz SM, Balkwill FR. Inflammation and cancer: advances and new agents. *Nature reviews Clinical oncology*. 2015;12(10):584-596.
29. Reuter S, Gupta SC, Chaturvedi MM, Aggarwal BB. Oxidative stress, inflammation, and cancer: how are they linked? *Free radical biology & medicine*. 2010;49(11):1603-1616.
30. Fernandes JV, Cobucci RN, Jatoba CA, Fernandes TA, de Azevedo JW, de Araujo JM. The role of the mediators of inflammation in cancer development. *Pathology oncology research : POR*. 2015;21(3):527-534.
31. Saed GM, Diamond MP, Fletcher NM. Updates of the role of oxidative stress in the pathogenesis of ovarian cancer. *Gynecologic oncology*. 2017;145(3):595-602.
32. Saed GM MR, Fletcher NM. New Insights into the Pathogenesis of Ovarian Cancer: Oxidative Stress. *In press*
33. Saed GM, Ali-Fehmi R, Jiang ZL, et al. Myeloperoxidase serves as a redox switch that regulates apoptosis in epithelial ovarian cancer. *Gynecologic oncology*. 2010;116(2):276-281.
34. Saed GM, Fletcher NM, Diamond MP, Morris RT, Gomez-Lopez N, Memaj I. Novel expression of CD11b in epithelial ovarian cancer: Potential therapeutic target. *Gynecologic oncology*. 2018;148(3):567-575.
35. Shan W, Liu J. Inflammation: a hidden path to breaking the spell of ovarian cancer. *Cell cycle (Georgetown, Tex)*. 2009;8(19):3107-3111.
36. Ness RB, Grisso JA, Cottreau C, et al. Factors related to inflammation of the ovarian epithelium and risk of ovarian cancer. *Epidemiology (Cambridge, Mass)*. 2000;11(2):111-117.
37. Ness RB, Cottreau C. Possible role of ovarian epithelial inflammation in ovarian cancer. *Journal of the National Cancer Institute*. 1999;91(17):1459-1467.

38. Freedman RS, Deavers M, Liu J, Wang E. Peritoneal inflammation - A microenvironment for Epithelial Ovarian Cancer (EOC). *Journal of translational medicine*. 2004;2(1):23.
39. Henderson WJ, Joslin CA, Turnbull AC, Griffiths K. Talc and carcinoma of the ovary and cervix. *J Obstet Gynaecol Br Commonw*. 1971;78(3):266-272.
40. Cramer DW, Welch WR, Scully RE, Wojciechowski CA. Ovarian cancer and talc: a case-control study. *Cancer*. 1982;50(2):372-376.
41. Rohl AN, Langer AM, Selikoff IJ, et al. Consumer talcums and powders: mineral and chemical characterization. *Journal of toxicology and environmental health*. 1976;2(2):255-284.
42. Zazenski R, Ashton WH, Briggs D, et al. Talc: occurrence, characterization, and consumer applications. *Regulatory toxicology and pharmacology : RTP*. 1995;21(2):218-229.
43. Blount AM. Amphibole content of cosmetic and pharmaceutical talcs. *Environmental health perspectives*. 1991;94:225-230.
44. Carbon black, titanium dioxide, and talc. *IARC monographs on the evaluation of carcinogenic risks to humans*. 2010;93:1-413.
45. Longo. Analysis of Johnson & Johnson Baby Powder & Valiant Shower to Shower Products for Amphibole (Tremolite) Asbestos, Expert Report of William E. Longo, PhD and Mark W. Rigler, PhD (August 2, 2017). 2017.
46. Longo. Below the Waist Application of Johnson & Johnson Baby Powder. Longo, William E., Mark W. Rigler, and William B. Egeland. Materials Analytical Service, LLC, September 2017. 2017.
47. Longo. Expert Report of William E. Longo, PhD and Mark W. Rigler, PhD, In re: Talcum Powder Prod. Liab. Litig., MDL No. 2738 (Nov. 12, 2018). 2018.
48. Longo R. TEM Analysis of Historical 1978 Johnson's Baby Powder Sample for Amphibole Asbestos, Expert Report of William E. Longo, PhD and Mark W. Rigler, PhD (Feb. 16, 2018).
49. Arsenic, metals, fibres, and dusts. *IARC monographs on the evaluation of carcinogenic risks to humans*. 2012;100(Pt C):11-465.
50. Acheson ED, Gardner MJ, Pippard EC, Grime LP. Mortality of two groups of women who manufactured gas masks from chrysotile and crocidolite asbestos: a 40-year follow-up. *British journal of industrial medicine*. 1982;39(4):344-348.
51. Wignall BK, Fox AJ. Mortality of female gas mask assemblers. *British journal of industrial medicine*. 1982;39(1):34-38.
52. Germani D, Belli S, Bruno C, et al. Cohort mortality study of women compensated for asbestosis in Italy. *American journal of industrial medicine*. 1999;36(1):129-134.
53. Berry G, Newhouse ML, Wagner JC. Mortality from all cancers of asbestos factory workers in east London 1933-80. *Occupational and environmental medicine*. 2000;57(11):782-785.
54. Magnani C, Ferrante D, Barone-Adesi F, et al. Cancer risk after cessation of asbestos exposure: a cohort study of Italian asbestos cement workers. *Occupational and environmental medicine*. 2008;65(3):164-170.
55. Reid A, Heyworth J, de Klerk N, Musk AW. The mortality of women exposed environmentally and domestically to blue asbestos at Wittenoom, Western Australia. *Occupational and environmental medicine*. 2008;65(11):743-749.
56. Vasama-Neuvonen K, Pukkala E, Paakkulainen H, et al. Ovarian cancer and occupational exposures in Finland. *American journal of industrial medicine*. 1999;36(1):83-89.
57. Langseth H, Kjaerheim K. Ovarian cancer and occupational exposure among pulp and paper employees in Norway. *Scandinavian journal of work, environment & health*. 2004;30(5):356-361.
58. Pira E, Pelucchi C, Buffoni L, et al. Cancer mortality in a cohort of asbestos textile workers. *British journal of cancer*. 2005;92(3):580-586.

59. Camargo MC, Stayner LT, Straif K, et al. Occupational exposure to asbestos and ovarian cancer: a meta-analysis. *Environmental health perspectives*. 2011;119(9):1211-1217.
60. Heller DS, Westhoff C, Gordon RE, Katz N. The relationship between perineal cosmetic talc usage and ovarian talc particle burden. *American journal of obstetrics and gynecology*. 1996;174(5):1507-1510.
61. Baan R, Straif K, Grosse Y, et al. Carcinogenicity of carbon black, titanium dioxide, and talc. *Lancet Oncol*. 2006;7(4):295-296.
62. *IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, Volume 86, Cobalt in Hard Metals and Cobalt Sulfate, Gallium Arsenide, Indium Phosphide and Vanadium Pentoxide* 2006.
63. Crowley. Expert Report of Michael Crowley, PhD, In re: Talcum Power Prod. Liab. Litig., MDL No. 2738 (Nov. 12, 2018). 2018.
64. Gertig DM, Hunter DJ, Cramer DW, et al. Prospective study of talc use and ovarian cancer. *Journal of the National Cancer Institute*. 2000;92(3):249-252.
65. Houghton SC, Reeves KW, Hankinson SE, et al. Perineal powder use and risk of ovarian cancer. *Journal of the National Cancer Institute*. 2014;106(9).
66. Gonzalez NL, O'Brien KM, D'Aloisio AA, Sandler DP, Weinberg CR. Douching, Talc Use, and Risk of Ovarian Cancer. *Epidemiology (Cambridge, Mass)*. 2016;27(6):797-802.
67. Penninkilampi R, Eslick GD. Perineal Talc Use and Ovarian Cancer: A Systematic Review and Meta-Analysis. *Epidemiology (Cambridge, Mass)*. 2018;29(1):41-49.
68. Berge W, Mundt K, Luu H, Boffetta P. Genital use of talc and risk of ovarian cancer: a meta-analysis. *European journal of cancer prevention : the official journal of the European Cancer Prevention Organisation (ECP)*. 2018;27(3):248-257.
69. Terry KL, Karageorgi S, Shvetsov YB, et al. Genital powder use and risk of ovarian cancer: a pooled analysis of 8,525 cases and 9,859 controls. *Cancer prevention research (Philadelphia, Pa)*. 2013;6(8):811-821.
70. Langseth H, Hankinson SE, Siemiatycki J, Weiderpass E. Perineal use of talc and risk of ovarian cancer. *Journal of epidemiology and community health*. 2008;62(4):358-360.
71. Huncharek M, Muscat J, Onitilo A, Kupelnick B. Use of cosmetic talc on contraceptive diaphragms and risk of ovarian cancer: a meta-analysis of nine observational studies. *European journal of cancer prevention : the official journal of the European Cancer Prevention Organisation (ECP)*. 2007;16(5):422-429.
72. Huncharek M, Geschwind JF, Kupelnick B. Perineal application of cosmetic talc and risk of invasive epithelial ovarian cancer: a meta-analysis of 11,933 subjects from sixteen observational studies. *Anticancer research*. 2003;23(2c):1955-1960.
73. Gross AJ, Berg PH. A meta-analytical approach examining the potential relationship between talc exposure and ovarian cancer. *Journal of exposure analysis and environmental epidemiology*. 1995;5(2):181-195.
74. Harlow BL, Cramer DW, Bell DA, Welch WR. Perineal exposure to talc and ovarian cancer risk. *Obstetrics and gynecology*. 1992;80(1):19-26.
75. Cramer DW, Vitonis AF, Terry KL, Welch WR, Titus LJ. The Association Between Talc Use and Ovarian Cancer: A Retrospective Case-Control Study in Two US States. *Epidemiology (Cambridge, Mass)*. 2016;27(3):334-346.
76. Hartge P, Hoover R, Leshner LP, McGowan L. Talc and ovarian cancer. *Jama*. 1983;250(14):1844.
77. Whittemore AS, Wu ML, Paffenbarger RS, Jr., et al. Personal and environmental characteristics related to epithelial ovarian cancer. II. Exposures to talcum powder, tobacco, alcohol, and coffee. *American journal of epidemiology*. 1988;128(6):1228-1240.

78. Booth M, Beral V, Smith P. Risk factors for ovarian cancer: a case-control study. *British journal of cancer*. 1989;60(4):592-598.
79. Harlow BL, Weiss NS. A case-control study of borderline ovarian tumors: the influence of perineal exposure to talc. *American journal of epidemiology*. 1989;130(2):390-394.
80. Chen Y, Wu PC, Lang JH, Ge WJ, Hartge P, Brinton LA. Risk factors for epithelial ovarian cancer in Beijing, China. *International journal of epidemiology*. 1992;21(1):23-29.
81. Rosenblatt KA, Szklo M, Rosenshein NB. Mineral fiber exposure and the development of ovarian cancer. *Gynecologic oncology*. 1992;45(1):20-25.
82. Tzonou A, Polychronopoulou A, Hsieh CC, Rebelakos A, Karakatsani A, Trichopoulos D. Hair dyes, analgesics, tranquilizers and perineal talc application as risk factors for ovarian cancer. *International journal of cancer*. 1993;55(3):408-410.
83. Shushan A, Paltiel O, Iscovich J, Elchalal U, Peretz T, Schenker JG. Human menopausal gonadotropin and the risk of epithelial ovarian cancer. *Fertility and sterility*. 1996;65(1):13-18.
84. Chang S, Risch HA. Perineal talc exposure and risk of ovarian carcinoma. *Cancer*. 1997;79(12):2396-2401.
85. Cook LS, Kamb ML, Weiss NS. Perineal powder exposure and the risk of ovarian cancer. *American journal of epidemiology*. 1997;145(5):459-465.
86. Green A, Purdie D, Bain C, et al. Tubal sterilisation, hysterectomy and decreased risk of ovarian cancer. Survey of Women's Health Study Group. *International journal of cancer*. 1997;71(6):948-951.
87. Godard B, Foulkes WD, Provencher D, et al. Risk factors for familial and sporadic ovarian cancer among French Canadians: a case-control study. *American journal of obstetrics and gynecology*. 1998;179(2):403-410.
88. Cramer DW, Liberman RF, Titus-Ernstoff L, et al. Genital talc exposure and risk of ovarian cancer. *International journal of cancer*. 1999;81(3):351-356.
89. Wong C, Hempling RE, Piver MS, Natarajan N, Mettlin CJ. Perineal talc exposure and subsequent epithelial ovarian cancer: a case-control study. *Obstetrics and gynecology*. 1999;93(3):372-376.
90. Mills PK, Riordan DG, Cress RD, Young HA. Perineal talc exposure and epithelial ovarian cancer risk in the Central Valley of California. *International journal of cancer*. 2004;112(3):458-464.
91. Goodman MT, Lurie G, Thompson PJ, McDuffie KE, Carney ME. Association of two common single-nucleotide polymorphisms in the CYP19A1 locus and ovarian cancer risk. *Endocr Relat Cancer*. 2008;15(4):1055-1060.
92. Merritt MA, Green AC, Nagle CM, Webb PM. Talcum powder, chronic pelvic inflammation and NSAIDs in relation to risk of epithelial ovarian cancer. *International journal of cancer*. 2008;122(1):170-176.
93. Moorman PG, Palmieri RT, Akushevich L, Berchuck A, Schildkraut JM. Ovarian cancer risk factors in African-American and white women. *American journal of epidemiology*. 2009;170(5):598-606.
94. Wu AH, Pearce CL, Tseng CC, Templeman C, Pike MC. Markers of inflammation and risk of ovarian cancer in Los Angeles County. *International journal of cancer*. 2009;124(6):1409-1415.
95. Rosenblatt KA, Weiss NS, Cushing-Haugen KL, Wicklund KG, Rossing MA. Genital powder exposure and the risk of epithelial ovarian cancer. *Cancer causes & control : CCC*. 2011;22(5):737-742.
96. Lo-Ciganic W-H, Zgibor JC, Bunker CH, Moysich KB, Edwards RP, Ness RB. Aspirin, Non-Aspirin Nonsteroidal Anti-inflammatory Drugs, or Acetaminophen and risk of ovarian cancer. *Epidemiology (Cambridge, Mass)*. 2012;23(2):311-319.

97. Kurta ML, Moysich KB, Weissfeld JL, et al. Use of fertility drugs and risk of ovarian cancer: results from a U.S.-based case-control study. *Cancer epidemiology, biomarkers & prevention : a publication of the American Association for Cancer Research, cosponsored by the American Society of Preventive Oncology*. 2012;21(8):1282-1292.
98. Wu AH, Pearce CL, Tseng CC, Pike MC. African Americans and Hispanics Remain at Lower Risk of Ovarian Cancer Than Non-Hispanic Whites after Considering Nongenetic Risk Factors and Oophorectomy Rates. *Cancer epidemiology, biomarkers & prevention : a publication of the American Association for Cancer Research, cosponsored by the American Society of Preventive Oncology*. 2015;24(7):1094-1100.
99. Schildkraut JM, Abbott SE, Alberg AJ, et al. Association between Body Powder Use and Ovarian Cancer: The African American Cancer Epidemiology Study (AACES). *Cancer epidemiology, biomarkers & prevention : a publication of the American Association for Cancer Research, cosponsored by the American Society of Preventive Oncology*. 2016;25(10):1411-1417.
100. Heller DS, Gordon RE, Westhoff C, Gerber S. Asbestos exposure and ovarian fiber burden. *American journal of industrial medicine*. 1996;29(5):435-439.
101. Egli GE, Newton M. The Transport of Carbon Particles in the Human Female Reproductive Tract. *Fertility and sterility*. 1961;12(2):151-155.
102. Sjosten AC, Ellis H, Edelstam GA. Retrograde migration of glove powder in the human female genital tract. *Human reproduction (Oxford, England)*. 2004;19(4):991-995.
103. Venter PF, Iturralde M. Migration of a particulate radioactive tracer from the vagina to the peritoneal cavity and ovaries. *South African medical journal = Suid-Afrikaanse tydskrif vir geneeskunde*. 1979;55(23):917-919.
104. RE J. Jones, Richard E., and Kristin H. Lopez. "Human Reproductive Biology - 4th Edition Chapter 9 - Gamete Transport and Fertilization." In *Human Reproductive Biology, Third.*, 159–73. San Diego: Academic Press, 2006. <https://doi.org/10.1016/B978-0-12-382184-3.00009-X>. MAS Project #14-1683, Analysis of William E. Longo, PhD and Mark W. Rigler, PhD (April 28, 2017).
105. Fedak KM, Bernal A, Capshaw ZA, Gross S. Applying the Bradford Hill criteria in the 21st century: how data integration has changed causal inference in molecular epidemiology. *Emerging themes in epidemiology*. 2015;12:14.

Exhibit A

CURRICULUM VITAE
REBECCA SMITH-BINDMAN, MD

Title Professor, Radiology and Biomedical Imaging, Epidemiology and Biostatistics,
Obstetrics, Gynecology and Reproductive Sciences, Phillip R. Lee Institute for Health Policy
Director, Radiology Outcomes Research Lab, University of California San Francisco

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350 Parnassus Ave, Suite 307
San Francisco, CA 94117
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EDUCATION

1980 - 1985	Princeton University	BSE	Engineering / Architecture
1985 - 1986	Columbia University		Post Bacc Pre-Med
1987 - 1991	University of California, San Francisco	MD	Medicine
1991 - 1992	University of California, San Francisco	Intern	Pathology
1992 - 1996	University of California, San Francisco	Resident	Radiology
1996 - 1997	University of California, San Francisco	Clinical Instructor	Radiology, Ultrasound
1996 - 1998	University of California, San Francisco	Fellow	Epidemiology & Biostatistics

LICENSES, CERTIFICATION

1992	California Medical License # G76462
1993	California X-ray Supervisor and Operator License RHL 143658
1996	Board Certification, American Board of Radiology

PRINCIPAL POSITIONS HELD

1998 - 2003	UCSF, Radiology and Biomedical Imaging, Epidemiology and Biostatistics, Obstetrics, Gynecology and Reproductive Sciences	Assistant Professor
2003 - 2009	UCSF, Radiology and Biomedical Imaging, Epidemiology and Biostatistics, Obstetrics, Gynecology and Reproductive Sciences	Associate Professor
2009 - current	UCSF, Radiology and Biomedical Imaging, Epidemiology and Biostatistics, Obstetrics, Gynecology and Reproductive Sciences	Professor
2014 - current	UCSF, Phillip R. Lee Institute for Health Policy Studies	Member
2000 - current	UCSF, Radiology Outcomes Research Lab	Director

OTHER POSITIONS HELD CONCURRENTLY

1999 - 2000	St Bartholomew's and The Royal London School of Medicine	Research Fellow
2009 - 2010	NIH, National Cancer Institute, Radiation Epidemiology Branch	Research Scientist

HONORS AND AWARDS

1985	Cum laude, Princeton University
1985	Senior Thesis Prize, Princeton University
1991	Student Summer Research Fellowship, Institute for Health Policy Studies, UCSF
1999, 2000	Nycomed Amersham Fellow, Radiologic Society of North America
2007	Nomination, Clinical Research Mentor of the Year, Bay Area Symposium on Clinical Research
2010	Nomination, CTSI Consultant of the Year, Impact Award
2010	Scientific Paper of the Year, Minnies, Auntminnie.com
2010	Finalist, Most Influential Radiology Researcher, Minnies, Auntminnie.com
2011	Leader in Imaging, Auntminnie.com
2012	Finalist, Scientific Paper of the Year, Auntminnie.com, Minnies
2012	Semifinalist, Scientific Paper of the Year, Auntminnie.com, Minnies
2012	Winner, UCSF Center for Health Care Value, Medical Center Initiative, Innovation Award
2013	Finalist, Scientific Paper of the Year, Auntminnie.com, Minnies
2013	Runner-up, Scientific Paper of the Year, Auntminnie.com, Minnies
2013	Paper honored as 1 of the top 10 publications Funded by NCI's Epidemiology and Genomics Research Program
2014	Invited Editor, J of the American College of Radiology, March 2014, Radiation Dose Optimization
2014	Among Philip R. Lee Institute for Health Policy Studies faculty videos on UCTV, "Is Medical Imaging Harmful to Health: Opportunities to Influence Health Policy", most popular, N = 409,937
2015	Academy of Radiology Research, Distinguished Investigator Award
2015	Election to Fellowship, Society of Radiologists in Ultrasound

KEYWORDS AND AREAS OF INTEREST

Health Services Research, Outcomes Research, Disparities Research, Women's Imaging, Comparative Effectiveness Research, Quality Improvement, Dissemination and Implementation Sciences, Evidenced Based Radiology, Assessment of Population Impact of Screening Tests, Radiation Associated with Medical Imaging, Radiation as an Environmental Cause of Cancer, Management of Incidental Findings on Diagnostic Testing

OVERVIEW

Narrative

Dr. Smith-Bindman is a clinical researcher with expertise in health services research, epidemiology, outcomes research, comparative effectiveness research, and dissemination and implementation sciences focused on diagnostic imaging. Her research has focused on evaluating the quality, utilization, accuracy, predictive values and impact of diagnostic testing on patient health, and has quantified both the risks and benefits of medical imaging when used in different contexts and by different populations. One area of focus has been on evaluating racial and ethnic differences in access and utilization of screening mammography and how that contributes to higher breast cancer mortality among African American women, and on factors that influence the quality and access to screening among vulnerable populations (see references 33, 34, 37, 43, 46, 48, 61, 67 at the end of CV). A separate area of focus has been on quantified the variation in radiation dose associated with medical imaging across patients and institutions, and quantified the impact of radiation, particularly from computed tomography, as an environmental carcinogen. (see references 53, 58, 60, 62, 65, 68, 69, 72, 76, 78, 79., 81, 87, 89, 91, 97, 102, 107.) Separate from her research activities, she has been actively involved in translating evidence into changes in practice and policy. She has *informed policy leaders, practitioners and the public about* the safety concerns surrounding the use of radiation in imaging by describing the issue in main stream media, testifying before the US Congress, and by advising the FDA, The Joint Commission, the International Atomic Energy Agency, the International Council on Radiation Protection and leading professional societies. She has also written quality measures focused on radiation safety, and her work has resulted in organizations which monitor health care quality to adopt measures of diagnostic imaging safety.

Significant Publications

1. **Smith-Bindman** et al. Ultrasound vs Computed Tomography for Suspected Nephrolithiasis NEJM. 2014; 371:1100-10
2. Miglioretti DL, Johnson E, William SA, Grenlee RT, Weinmann S, Solberg LI, Feigelson HS, Roblin D, Flynn MJ, Vanneman N, **Smith-Bindman R**. The use of computed tomography in pediatrics and the associated radiation exposure and estimated cancer risk. JAMA Pediatr. 2013 167 (88): 700-7
3. **Smith-Bindman R**, et al. Risk of Thyroid Cancer based on Thyroid Ultrasound Imaging Characteristic: Result of A Population Based-Study. JAMA Internal Medicine. 2013 173(19):1788-96
4. **Smith-Bindman R**. Appendix F. Ionizing Radiation Exposure to the US Population, with a Focus on Radiation from Medical Imaging, included in Breast and the Environment: A Life Course Approach. The Institute of Medicine. March 20 2012
5. **Smith-Bindman R et al**. Radiation dose associated with common computed tomography examinations and the associated lifetime attributable risk of cancer. JAMA Internal Medicine 2009;169(22):2078-86
6. Curtis E, Quale C, Haggstrom D, **Smith-Bindman R**. Racial and Ethnic Differences in Breast Cancer Survival: How Much Is Explained By Screening, Tumor Severity, Biology, Treatment, and Co-morbidities. Cancer 2008 112(1):171
7. Goldman L, Haneuse S, Miglioretti D, Kerlikoswke K, Buist D, Yankaskas B, **Smith-Bindman R**, An assessment of the quality of mammography care at facilities treating medically vulnerable populations Medical Care 2008 46(7):701-8.
8. **Smith-Bindman et al**. Does Utilization of Screening Mammography Explain Racial and Ethnic Differences in Breast Cancer? Ann Intern Med. 2006; 144(8):541-53
9. Haggstrom DA, Quale C, **Smith-Bindman R**. Differences in the Quality of Breast Cancer Care Among Vulnerable Populations. Cancer. 2005 Dec 1;104(11):2347-58.
10. **Smith-Bindman, R**, et al Endovaginal ultrasound to evaluate endometrial abnormalities. JAMA 1999;281:1693-4

PROFESSIONAL ACTIVITIES

CLINICAL

Attending physician, Ultrasound Section, Department of Radiology and Biomedical Imaging, UCSF, 25%. Includes supervised instruction of residents and fellows. My teaching focuses on how to use evidence to help inform interpretation of clinical examinations.

PROFESSIONAL ORGANIZATIONS

Memberships

1997 - 2018	Society of Radiologists in Ultrasound (SRU)
1997 - 2018	Radiology Alliance for Health Services Research in Radiology (RAHSR)
2013 - 2018	American College of Radiology (ACR)
2014 - 2018	American Roentgen Ray Society (ARRS)
2014 - 2018	Association of University Radiologists (AUR)

Service to Professional Organizations (selected)

2010 - 2011	American Board of Medical Specialties, American Board of Radiology, American College of Radiology, and Physician Consortium for Performance Improvements. Patient Radiation Dose Work Group
2011 - 2012	Institute of Medicine Committee on Breast Cancer and the Environment, commissioned report "Temporal Changes in Ionizing Radiation and Estimate of Contributions to Breast Cancer," contributing author
2012	Centers for Disease Control and Prevention, Cancer Prevention Work Group
2012 - 2014	The Joint Commission, Diagnostic Ionizing Radiation and Magnetic Resonance work group focused on issues of safety and guideline development
2012 - Present	International Council on Radiation Protection (ICRP) Task Group #79 on Defining Effective Dose Use in Medicine
2014	International Atomic Energy Agency (IAEA) United Nations General Assembly and Security Council. Special Committee Considering Population Impact of Low Dose Radiation
2015	Council of Distinguished Investigators of the Academy of Radiology Research

Service to Professional Publications (selected)

2000 - 2018	Journal of the American Medical Association (JAMA)
2000 - 2018	JAMA Internal Medicine
2000 - 2018	New England Journal of Medicine (NEJM)
2000 - 2018	Radiology
2000 - 2018	American Journal of Radiology
2000 - 2011	Journal of the National Cancer Institute
2000 - 2011	Health Affairs

2000 - 2015	Health Services Research
2000 - 2010	American Journal of Obstetrics & Gynecology
2000 - 2010	American Journal of Public Health
2000 - 2010	Annals of Internal Medicine
2000 - 2010	Journal of Medical Screening
2000 - 2010	Journal of Women's Health
2000 - 2010	Medical Care
2000 - 2010	Medical Decision Making
2000 - 2010	Obstetrics and Gynecology
2000 - 2010	Ultrasound in Obstetrics & Gynecology

INVITED PRESENTATIONS

International

2001	US - UK Cancer Learning Network, Deprivation and Cancer, <i>London, United Kingdom</i>
2001	British Society of Human Genetics, Prenatal Screening for Down syndrome in England and Wales and Birth Outcomes, <i>London, United Kingdom</i>
2002	Global Summit on Mammographic Screening, Europe Institute of Oncology, U.S.-U.K. Comparison of Screening Mammography, <i>Milan, Italy</i>
2005	University of Copenhagen, Does Practice Make Perfect; Association Between Volume and Accuracy of Mammography, <i>Copenhagen, Denmark</i>
2006	International Society for Prenatal Diagnosis, Prenatal Screening for Down syndrome in The Second Trimester of Pregnancy, <i>Kyoto, Japan</i>
2009	Canadian Breast Cancer Foundation, Forum on the Earlier Detection and Diagnosis of Breast Cancer, <i>Toronto, Canada</i>
2010	Nation Cancer Research Institute (NCRI), Risk of Cancer from Computed Tomography Examinations, <i>Liverpool, United Kingdom</i>
2013	Bach Mai University Hospital, Radiation for Medical Imaging: A Hidden Epidemic, <i>Hanoi, Vietnam</i>
2014	International Atomic Energy Agency (IAEA), Health Effects of Exposure to Low Dose Ionizing Radiation Associated with Medical Imaging, <i>Vienna, Austria</i>
2014	Korea College of Radiology, Tracking and Monitoring Radiation Dose and Its Impact Across the University of California Medical Centers and CT Radiation Doses Are Not What You Think: Why It's Important to Monitor and Track Dose Seoul, Republic of Korea
2016	International Atomic Energy Agency (IAEA), Exposure to low dose ionizing radiation from medical imaging and the health effects from these exposures. International Atomic Energy Agency. Technical Meeting on Science, Technology and Society Perspectives on Nuclear Science, Radiation and Human Health: The View from Asia, Singapore University
2016	University of North Carolina School of Medicine, Chapill Hill, NC, Radiology Department Grand Rounds , Diagnostic Imaging: Increasing Effectiveness and Safety Radiation From Medical Imaging,

- 2016 Singapore General Hospital, Singapore. Radiology Grand Rounds. Visualizing Patients and Their Dose to Improve Health Care Quality,
- 2016 St Luke's International Hospital, Tokyo, Japan. Hospital-wide grand rounds, Radiation from Medical imaging: A Hidden Epidemic.
- 2017 Childhood Leukemia International Consortium, Annual Meeting, Minneapolis, Minnesota, Estimating Radiation Exposure from Imaging Procedures
- 2017 Charity Hospital, Berlin, Germany. Radiology Grand Rounds, Radiation from Medical Imaging: A Hidden Epidemic
- 2017 Charity Hospital, Berlin, Germany, Imaging for Suspected Nephrolithiasis: Results from the Randomized Controlled Trial
- 2017 University Hospital, Basel, Switzerland, Radiology Grand Rounds. A Dose of Reality: The Need for Active CT Dose Management
- 2017 Center for Diagnostic Imaging Quality Institute Council of Medical Directors, Scottsdale, AZ Keynote: Radiation from Medical Imaging
- 2017 The Leap Frog Group Pediatric Computed Tomography Radiation Dose
- 2017 PCORI Advisory Panel on Communication and Dissemination Research Presentation UCSF CT Radiation Dose Registry to Ensure a Patient-Centered Approach for Imaging
- 2017 American Urological Association (AUA) Quality Improvement Summit, Baltimore Maryland Keynote Address. Imaging Wisely: Improving the Value of Medical Imaging
- 2018 Jakarta Radiology Society, Jakarta Indonesia. Dose Optimization Implementation to achieve better radiology service in Hospital Keynote Addresses: Radiation from Medical Imaging: A Hidden Epidemic and Optimizing Radiation Doses for CT
- 2018 Westmead Hospital Sydney Australia. Radiology Grand Rounds. Radiation from Medical Imaging: A Hidden Epidemic
- 2018 Westmead Childrens Hospital, Sydney Australia. Optiizing Radiation Doses For Pediatric CT
- National
- 2000 American College of Medical Genetics
- 2000 Society of Radiologists in Ultrasound
- 2000 Society for Health Services Research in Radiology
- 2001 Society of Radiologists in Ultrasound Annual Meeting

2001	Society for Health Services Research in Radiology
2002	Society of Radiologists in Ultrasound
2003	Breast Cancer Surveillance Consortium
2003	Society of Radiologists in Ultrasound
2003	Centers for Disease Control and Prevention
2003	RSNA 88th Scientific Assembly and Annual Meeting
2004	Institute of Medicine (IOM): Saving Women's Lives
2004	Breast Cancer Surveillance Consortium
2005	Improving Mammographic Quality Standards Institute of Medicine (IOM)
2006	Beth Israel Deaconess Medical Center, Grand Rounds
2006	National Institute Child Health and Human Development
2007	National Cancer Institute, National Institute of Health (x2)
2008	Mount Sinai Urban Health Institute; Metro Chicago Breast Cancer Taskforce, Partnerships in Translation: Advancing Research and Clinical Care
2008	University of Washington, Seattle, Washington, Grand Rounds, and Visiting Professor,
2008	HMO Research Network Conference (4 th annual), Danville, Pennsylvania
2009	Society of Radiologists in Ultrasound, National Conference on Management of Ovarian Cysts
2009	Canadian Forum for the Earlier Detection and Diagnosis of Breast Cancer
2010	Center for Disease Control & Prevention, Annual Cancer Registry Meeting, Atlanta, Georgia
2010	HMO Research Network conference, Emerging Frontier in Healthcare, Research Delivery, Austin, Texas
2010	National Council on Radiation Protection (NCRP), Communication of Radiation Benefits and Risks in Decision Making
2010	National Cancer Institute, Board of Scientific Advisors, Bethesda, Maryland
2010	American Statistical Association Conference on Radiation Health, Annapolis, Maryland
2010	Breast Cancer Surveillance Consortium Annual Meeting, Washington, D.C.
2010	Kaiser Permanente: National Radiology Leadership Group, held at the RSNA, Chicago, IL
2011	Cleveland Clinic, Health Care Quality Innovation, Cleveland, Ohio
2011	Auntminnie.com, Live WebEx Conference RADEXPO 2011
2011	University of New Mexico, Visiting Professor, External Reviewer, Resident Research Day
2011	Oregon Health Sciences University, Department of Emergency Medicine, Grand Rounds
2012	Society for Imaging Informatics for Medicine (SIIM), San Francisco, CA
2012	Brown University, Grand Rounds, Emergency Medicine, RI Hospital, Providence, RI
2012	Society for Imaging Informatics in Medicine (SIIM), Los Angeles, CA

2012 PharmMed OUT, Georgetown University, Washington, DC

2012 Agency for Healthcare Research and Quality, Rockville, MD

2012 Radiology Society of North America, expert witness in full day mock trial focused on radiation safety and whether radiologists need to communicate risks to patients, Chicago, IL

2012 University of Pennsylvania, Grand Rounds, Emergency Medicine, Philadelphia, PA

2013 Radiology Society of North America (RSNA), Controversies Session, CT Radiation and Risk: How Certain Are We of the Uncertainty? Chicago, IL

2013 American Cancer Society, Doc Talk Lecture Series

2013 Association of University Radiologists (AUR), Comparative Effectiveness and Patient-centered Outcomes Research, Los Angeles, CA

2014 Cancer.net Podcast, "CT Scans and Cancer Risk", Available Online at <http://www.cancer.net/blog/2014-10/ct-scans-and-cancer-risk>

2014 Oregon Chapter, American College of Emergency Physicians, Portland, Oregon

2015 Women in Government Foundation (non-profit, non-partisan organization of all U.S. female state legislators) Diagnostic Imaging. Increasing Its Effectiveness and Safety, at 16th Annual Southern & Eastern Regional Conference, Charleston S Carolina

2016 Lindeberger Cancer Center, University of North Carolina, Chappil Hill NC, Radiation From Medical Imaging: A Hidden Epidemic

2017 American Urological Association (AUA) Quality Improvement Summit, Baltimore Maryland Keynote Address. Imaging Wisely: Improving the Value of Medical Imaging

Regional Presentations (selected)

2000 Kaiser Permanente Department of Genetics, Oakland CA

2001 San Francisco State University, SF CA

2001 UCSF, San Francisco General Hospital, Department of Medicine, Grand Rounds

2001 American College of Obstetrics and Gynecology

2002 UCSF Breast Oncology Program Comprehensive Cancer Center Grand Rounds

2003 UCSF Obstetrics and Gynecology Grand Rounds, SF CA

2004 UCSF Multi-Department Symposium. Racial Disparity and Breast Cancer, SF CA

2004 UCSF Quality of Breast Cancer Care Symposium, SF CA

2005 Sisters Network, San Francisco (African American Advocacy Organization)

2005 Stanford University, Department of Health Research and Policy, Grand Rounds, Palo Alto CA

2006 UCSF, Lunch and Learn: San Francisco Community Outreach, SF CA

2006 Bay Area Health Care and Quality Outcomes, San Francisco, CA

2007 California Breast Cancer Research Symposium, Los Angeles, CA

2010 Bay Area Clinical Research Symposium, Plenary Speaker, San Francisco CA

2011	UCSF Department of Medicine Grand Rounds, San Francisco, CA
2011	San Francisco General Hospital Department of Medicine, Grand Rounds, San Francisco, CA
2011	UCSF, Department of Urology Grand Rounds, San Francisco, CA
2011	UCSF Department of Radiology Grand Rounds, San Francisco, CA
2011	Eden Hospital, Department of Medicine Grand Rounds, Alameda, CA
2011	Stanford Hospital, Department of Medicine, Grand Rounds, Palo Alto, CA
2011	Kaiser Permanente Medical Center, Multi-departmental Grand Rounds, San Francisco, CA
2011	UCSF Institute for Health Policy Studies, San Francisco, CA.
2012	Kaiser Permanente Medical Center, Grand Rounds, San Francisco, CA
2012	Kaiser Permanente Medical Center, Grand Rounds, Oakland, CA
2012	Massachusetts General Hospital, Department of Emergency Medicine, Grand Rounds Boston,
2012	Beth Israel Hospital, Department of Emergency Medicine Grand Rounds, Boston, MA
2012	Univ. of California Office of the President, Quality Improvement and Technology, Oakland, CA
2012	UCSF, Department of Radiation Oncology, Grand Rounds,
2012	Southern California Kaiser Radiology Chiefs Grand Rounds,
2014	UCSF, Endocrine Grand Rounds, San Francisco, CA
2015	California Society of Radiology Technologists, Annual Meeting, San Francisco, CA Keynote Address. Radiation from CT: A Hidden Epidemic. Strategies to minimize doses: What technologists can do?
2016	Society of Radiology in Ultrasound, Annual Meeting, Baltimore Maryland. Risk of Thyroid Cancer Based on Thyroid Ultrasound Imaging Characteristics
2016	UCSF, Breast Oncology Program, Radiation from Medical Imaging: A Hidden Epidemic and Approaches for Improving.
2016	UCSF Mini-Medical School Radiation Safety and Medical Imaging
2017	University of California Davis, Radiology Grand Rounds, Radiation from Medical Imaging; A Hidden Epidemic
2017	UCSF: Stand Up for Science: Panel Discussant

GOVERNMENT AND OTHER PROFESSIONAL SERVICE (selected)

2002 - 2003	CDC, National Breast and Cervical Cancer Early Detection Program, Planning Committee
2002 - 2005	Cochrane Collaboration Screening and Diagnostic Tests, Methods Working Group
2003 - 2003	Radiology National Boards, Examination Question Writer
2003 - 2010	National Cancer Institute, Physician Data Query (PDQ)

2004 - 2005	CDC, National Breast and Cervical Cancer Early Detection Program, Panelist, Committee on Assessment of Covered Benefits, Expert
2007 - 2010	California Health Benefits Review Program (CHBRP)
2008 - 2011	Center for Scientific Review, NIH, Health Services Organization and Delivery Study Section
2010 - 2011	American Board of Medical Specialties, American Board of Radiology, American College of Radiology, and Physician Consortium for Performance Improvements. Patient Radiation Dose Work Group
2010	Congressional Hearing, US House of Representatives, Energy and Commerce, Subcommittee on Health. Medical Radiation: An Overview of the Issues. Expert Witness
2010	Food and Drug Administration, Center for Devices & Radiological Health, National Meeting Focus on Radiation Safety, Presenter
2010 - 2011	National Quality Forum, Imaging Efficiently Steering Committee
2011 - 2012	Institute of Medicine Committee on Breast Cancer and the Environment, commissioned report "Temporal Changes in Ionizing Radiation and Estimate of Contributions to Breast Cancer," contributing author
2010 - 2011	Lung Cancer Screening with CT Evidence Review Committee. Multidisciplinary collaboration, including American Cancer Society, American College of Chest Physicians; American Society of Clinical Oncology & The National Comprehensive Cancer Network
2011 - 2016	International Council on Radiation Protection (ICRP), Task Group 79 on Defining Effective Dose Use in Medicine
2012	Congressional Hearing, US House of Representatives, Energy and Commerce, Subcommittee on Health, hearing on the Consistency, Accuracy, Responsibility, and Excellence in Medical Imaging and Radiation Therapy (The CARE Bill), Expert Witness
2012	Centers for Disease Control and Prevention, Cancer Prevention Work Group
2012 - 2014	The Joint Commission, Diagnostic Ionizing Radiation and Magnetic Resonance work group focused on issues of safety and guideline development
2013	Government Accountability Office: Medicare Imaging Accreditation Establishing Minimum National Standards and an Oversight Framework to Ensure Quality and Safety of Advanced Diagnostic Imaging Services, May 2013, Contributor
2014	International Atomic Energy Agency (IAEA) United Nations General Assembly and Security Council. Special Committee Considering Impact of Low Dose Radiation
2015	Council of Distinguished Investigators of the Academy of Radiology Research

UNIVERSITY AND PUBLIC SERVICE

Service Narrative

There are several activities to which Dr. Smith-Bindman has contributed. For seven years she participated in the NCI sponsored Physicians Data Query (PDQ), an NCI committee charged with presenting evidenced based, on-line, widely accessible and widely disseminated guidelines relating to cancer screening and diagnosis. She

participated in several activities related to breast cancer screening including acting as a reviewer for the CDC on assessing the guidelines for the National Breast and Cervical Cancer Detection Program, participating in coverage decisions, acting as reviewer and content expert for the CA Health Benefits Review Program analyzing several bills before the state legislature that would expand breast cancer screening to include MRI, and participating in the creation of several IOM Reports. She has participated in several community projects, such as acting on the board of an African American breast cancer advocacy group, and as a consultant to the Metropolitan Breast Cancer Task Force, charged with improving breast cancer mortality rates and racial disparities. During the last five years She has been very active in local, statewide and national efforts around improving radiation safety, including invited presentations to the FDA, testifying before the US Congress on two occasions, working with innumerable societies and government organizations on guidelines and submitting two endorsed quality measures on radiation safety to the National Quality Forum. Her involvement in service activities within the University have focused on increasing the quality and quantity of translational research through participation in several University-wide task forces. Dr. Smith-Bindman serves on several Medical Center Committees, focusing on improved oversight and stewardship around radiation, and projects to improve the efficiency and effectiveness with CT.

UNIVERSITY SERVICE (selected)

2001 - 2015	UCSF School of Medicine, Faculty Recruitment Committees, Radiology, Rad Onc, Medicine
2002	UCSF School of Medicine Dean's Leadership Retreat, Santa Cruz
2003	University of California, Blueprint for Regional Excellence in Breast Cancer Care
2003	UCSF School of Medicine Task Force, Future of UCSF and Mission Bay
2003	UCSF Medical Center, Hospital Exceptional Physician Award, Committee Co-Chair
2003 - 2004	UCSF School of Medicine Task Force, Physician Scientist Program Clinic-Based
2003 - 2005	UCSF School of Medicine Faculty Council
2005	UCSF School of Medicine, Dean's Leadership Retreat, Santa Cruz, CA
2005 - 2006	UCSF Department of Radiology Seminars and Presentation Committee
2005 - 2008	UCSF Department of Radiology Annual Research Symposium Abstract Review Committee
2005 - 2009	UCSF Department of Radiology, SEED Grant Review Committee
2006 - 2007	UCSF Pathways for Clinical and Translational Research
2008 - 2010	UCSF Pathways to Discovery, Clinical and Translational Research, Advisory Council
2007 - 2010	University of California, Office of the President, CA Health Benefits Review Program
2009 - 2017	UCSF, Radiation Safety Committee
2012 - 2014	UCSF Department of Radiology, Maintenance of Certification Committee
2012 - 2015	UCSF Medical Center, Center for Health Care Value
2013 - 2017	UCSF School of Medicine, Conflict of Interest Advisory Committee
2014 - 2016	UCSF Clinical Enterprise, Strategic Plan, Committee for Continuous Process Improvement
2015 - 2017	UCSF Clinical Enterprise, Utilization Management Committee

PUBLIC SERVICE

2003 – 2007	SF Sisters, an African American breast cancer advocacy group, board member
2008 - 2008	Metropolitan Chicago Breast Cancer Task Force, Chicago IL, unpaid consultant
2011 - 2014	National Quality Form, National Consensus Standard for Patient Safety. Measure Developer "UCSF CT Radiation Dose Patient Safety Measure" Measure endorsed
2015	National Quality Forum, Pediatric Measures. Measure Developer, "Pediatric Computed Tomography Radiation Dose" Measure endorsed

TEACHING AND MENTORING

Teaching Narrative

Dr. Smith-Bindman spends substantial time mentoring trainees in clinical research. The trainees have ranged in experience from high school students through mid-career UCSF faculty. The individuals have come from a broad range of departments at UCSF including Radiology, Internal Medicine, Hospital Medicine, Emergency Medicine, Obstetrics and Gynecology, and Urology, and have also come from the UCSF Medical School, The University of California Berkeley, and local SF high schools. On average, she meets with each trainee 1-2 hours per week while collaborating. An NIH Mid-Career Investigator Award (K24) supported her time mentoring these individuals.

She teaches in several formal classes in the department of Epidemiology and Biostatistics primarily targeted to post graduate students who are completing a master's degree in clinical research. She is actively engaged in teaching the Radiology residents and fellows while attending on the clinical service and provides frequent lectures to the Radiology residents focused at research methods; frequently teaches in courses organized by the UCSF Office of Continuing Medical Education for both radiology courses and courses within other medical specialties. The radiology courses focus on using evidence to interpret our studies (usually focused on ultrasound topics), the lectures for other medical specialties focused on how to use imaging more appropriately. As listed above, she also frequently gives grand rounds within UCSF, and nationally on using imaging more appropriately. Lastly, she organized and ran a large, ongoing, virtual symposium on Radiation Safety described below. Both the content and format of this meeting were novel.

TEACHING

Formal scheduled classes for UCSF students.

The first class listed is a course for UCSF Medical Students. The remaining are part of the coursework offered within the UCSF Masters in Clinical Research Program, Department of Epidemiology and Biostatistics

Year	Title	Role	Class Size
2002 - 2005	Epidemiology and Biostatistics, UCSF School of Med	Section Leader	20
2005	Introduction to Diagnostic Testing	Lecturer	18
2007 - 2008	Clinical Performance and Health Outcome Measurement	Lecturer	20
2011 - 2014	Translating Evidence into Policy: Theory and Design	Lecturer	30
2010 - 2015	Framing Research to Influence Policy	Lecturer	25

Post Graduate CME courses (1-5 lectures/meeting)

2001	UCSF Obstetrics and Gynecology Update, San Francisco, CA
2001	UCSF Primary Care Medicine, Aspen, CO
2001	Primary Care Medicine, Maui, HI
2001	Management of the Hospitalized Patient, San Francisco, CA
2001	Controversies in Women's Health, San Francisco, CA
2001	Diagnostic Imaging in Women's Health, San Francisco, CA
2001	MRI & Ultrasound Imaging, Lake Tahoe, CA
2002	Obstetrics and Gynecology Update, San Francisco, CA.
2002	17th Annual Primary Care Medicine: Concepts and Controversies, Aspen, CO
2002	10th Annual Controversies in Women's Health, San Francisco, CA
2002	Diagnostic Imaging in Women's Health, San Francisco, CA
2002	Diagnostic Imaging, Maui, HI
2002	Obstetrical, Gynecological and Abdominal Ultrasound, San Francisco, CA
2003	Primary Care Medicine, Diagnostic Imaging in Women's Health, Maui, HI
2003	11th Annual Controversies in Women's Health, San Francisco, CA
2003	Diagnostic Imaging for Disease Prevention, San Francisco, CA
2003	46th Annual Diagnostic Radiology Postgraduate Course, San Francisco, CA
2003	OB/GYN and Abdominal Ultrasound, San Francisco, CA
2003	MRI and Ultrasound by the Lake, Lake Tahoe, CA
2004	Women's Imaging, Sonoma, CA
2004	Primary Care Medicine, Maui, HI
2004	Diagnostic Imaging in Clinical Practice, San Francisco, CA
2005	Obstetrical and Gynecologic Sonography, San Francisco, CA
2005	Radiology Spring Training, Scottsdale, Arizona
2005	Abdominal Imaging, Montreal and Quebec, Canada
2006	Controversies in Women's Health, San Francisco, CA
2006	Controversies in Breast Cancer Screening and Diagnosis, San Francisco, CA
2006	Cutting Edge Radiology, Diagnosis and Intervention, Vancouver, Canada
2008	Primary Care Medicine: Update 2008, San Francisco, CA
2008	Diagnostic Imaging in Women's Health, San Francisco, CA
2008	Obstetrical/Gynecological and Abdominal Sonography, San Francisco, CA
2009	Primary Care Medicine: Update 2008, San Francisco, CA

2009	Obstetrical/Gynecological and Abdominal Sonography Update, San Francisco, CA
2011	Imaging of Kidney Stones, San Francisco, CA, Director
2011	Primary Care Medicine, Principles & Practice, San Francisco, CA, Keynote
2011	39th Annual Advances in Internal Department of Medicine, San Francisco, CA, Keynote
2011	Controversies in Women's Health, Department of Medicine, San Francisco, CA, Keynote
2012	Updates on Imaging, Maui, Hawaii
2013	UCSF Otolaryngology Annual Conference, San Francisco, CA
2017	UCSF Practical Body Imaging, Kona, Hawaii

Other Teaching

Radiation Safety and CT: Virtual Symposium. Innovative on-line Interactive CME course targeted to physicians (radiologists and those who order imaging), technologists, medical physicists, and trainees. This was created as an on-line, free, virtual meeting focuses on radiation safety. The initial creation of this virtual meeting began in 2013. Creating the meeting involved creating a multidisciplinary, on line, virtual meeting with over 100 lectures (see list of lectures, now offered freely on line - <http://rorl.ucsf.edu/speakers>), 10 live interactive sessions/chat rooms and over 500 registrants enrolled in the meeting during the “live days”, and ongoing attendees attend each month. The speakers at the meeting included numerous department chairs, the director of the Agency for Health Care Policy at the time, a US Congressman, leaders from numerous societies, The Joint Commission, The American Board of Internal Medicine Foundation, and innumerable scientific experts on diverse patient safety issues, and the meeting was an integration of diverse viewpoints and perspectives. Dr. Smith-Bindman directed this meeting and personally wrote and delivered 7 lectures for the meeting. The meeting was novel in format and content.

MENTORING

Pre-doctoral students directly supervised

Dates	Name	Program or School	Current Position
2004 - 2005	C. Kagay	UCSF Medical School	Radiologist, Private Practice
2005 - 2006	A. Ding	UCB/ UCSF MD/MPH	MGH
2005 - 2008	A. Venkatesan	UCSF Medical School	Resident, Stanford
2006 - 2007	E. Dinkelspiel	Urban High School	Student, Univ. of Chicago
2011 - 2015	J. Keegan	Lick Wilmerding High	San Luis Obispo College
2010 - 2015	P. Mehta	UC Berkeley/UCLA Med School	UCLA Medical School
2012 - 2013	J. Zhang	UC Berkeley	Senior
2014 summer	A. Fraser	University High	Georgetown College

Postdoctoral fellows and residents directly supervised

Dates	Name	Position	Current Position
1998 - 2000	M. Copanigro, MD	Radiology Resident / Fellow	Private Practice

1998 - 2000	N. Vincoff, MD	Radiology Resident / Fellow	Private Practice
2003 - 2004	E. Weiss, MD	OB GYN Resident	Private Practice
2003 - 2005	K. Schueler, MD	RORL Research Fellow	Private Practice
2003 - 2005	D. Haggstrom, MD	Internal Medicine Fellow	Indiana University, Faculty
2005 - 2006	K. Reid, MD	Internal Medicine Fellow	Emory Faculty
2005	A. Jensen	PhD student, Copenhagen	Faculty
2005 - 2006	B. Ching, MD	Radiology Fellow	Private Practice,
2005 - 2006	A. Cole, MD	Radiology Fellow	Private Practice
2005 - 2007	L. Goldman, MD	Internal Medicine Fellow	UCSF Faculty
2006 - 2010	J. Lipson, MD	Radiology T32 Scholar	Stanford Faculty
2007 - 2008	J Stengel, MD	Radiology Fellow	Private Practice
2007 - 2008	A. Heath, MD	RORL Research Fellow	Private Practice
2007 - 2009	R. Cho, MD	Radiology Fellow	Private Practice
2007 - 2009	D. Sellami, MD	Radiology Resident / Fellow	Private Practice
2008 - 2009	A. Kamath, MD	Radiology T32 Scholar	NYU Faculty
2009 - 2010	J Ching, MD	OB GYN Resident	Faculty
2009 - 2011	N, Brasic, MD	Radiology Fellow	UCSF Faculty
2010 - 2011	D. Sridhar, MD	Radiology Resident	Private Practice
2010 - 2012	P. Lebda, MD	Radiology Fellow	Cleveland Clinic Faculty
2010 - 2013	I. Burger, MD	Radiology Resident	Private Practice
2010 - 2013	G. Merry, MD	Radiology Resident	Private Practice
2011 - 2014	J. Mongan, MD PhD	Rad Resident / Fellow	UCSF, Faculty
2013 - 2014	S. Hou, MD	Radiology Resident	NYU Faculty
2013 - 2014	C. Lee, MD	Radiology Resident	UCSF Faculty
2013 - 2014	T. Morgan, MD	Radiology Resident	UCSF Faculty
2013 - 2015	LA Hampton, MD	Urology Resident / Fellow	Fellow, Wash U
2013 - 2015	V. Arasu, MD	Radiology Resident	Resident
2013 - 2015	N. Benedetti, MD	Radiology Resident	University of Wash Faculty
2014 - 2015	B Carpenter, MD	Radiology Fellow	UCSF Faculty
2014 - 2015	J. Hsu, MD	Radiology Fellow	Private Practice
2014 - 2018	J. Demb	Epidemiology	UCSF

Faculty Mentoring

Dates	Name	Department / Section	Current Position
2002 - 2005	John Shepherd, MD	Radiology / Musculoskeletal	UCSF, Faculty, Radiology
2004 - 2005	Elaina Curtis, MD	UCSF Visiting Fellow	Univer. of Auckland Faculty
2005 - 2006	John Stein, MD	Emergency Medicine	UCSF Faculty, Emerg Med
2005 - 2006	Max Wintermark, MD	Radiology / Neuro	UVA, Faculty, Radiology
2007 - 2013	Lauren Goldman, MD	Internal Medicine	UCSF, Faculty, Medicine
2008 - 2011	Larry Rand, MD	OBGYN / Maternal Medicine	UCSF, Faculty, OBGYN
2008 - 2014	Antonio Westphalen, MD	Radiology / Abdominal Imaging	UCSF, Faculty, Radiology
2009 - 2017	Liina Poder, MD	Radiology / Abdominal Imaging	UCSF, Faculty, Radiology
2010 - 2018	Ralph Wang, MD	Emergency Medicine	UCSF Faculty, Emerg Med
2014 - 2018	John Mongan, MD, PhD	Radiology / Abdominal Imaging	UCSF, Faculty, Radiology
2014 - 2017	Cindy Lee, MD	Radiology / Abdominal Imaging	UCSF, Faculty, Radiology
2014 - 2017	Tara Morgan, MD	Radiology / Abdominal Imaging	UCSF, Faculty, Radiology
2014 - 2018	Maureen Kohi, MD	Radiology / Interventional	UCSF, Faculty, Radiology
2015 - 2018	Ben Franc, MD PhD	Radiology / Nuclear Medicine	UCSF, Faculty, Radiology
2017 - 2018	Brian Haas MD	Radiology	UCSF, Faculty, Radiology

RESEARCH AND CREATIVE ACTIVITIES

Research Narrative

Dr. Smith-Bindman's research focuses on understanding the impact of diagnostic testing on patient outcomes. She is the director of the UCSF Radiology Outcomes Research Laboratory, and her team includes several programmers, biostatisticians, a developer, and a handful of epidemiologists who serve as project managers for the funded grants below. Her research expertise is in areas of epidemiology, technology assessment, outcomes research, comparative effectiveness research, health services research, and dissemination and implementation sciences focused on imaging. The research has focused on evaluating the quality, utilization, accuracy, predictive values and impact of diagnostic testing on patient health, and has quantified both the risks and benefits of medical imaging when used in different contexts and by different populations. I am leading several studies that assess and standardize the radiation dose used for CT scanning, in order to minimize doses, without loss of diagnostic accuracy. Additional current research is focused on putting systems-based solutions in place to standardize the use of imaging. For example, ongoing projects focus on improving decision support provided to physicians to help improve the use of testing, using evidence to drive and guide the change in practice, and determining the optimal surveillance strategy for the follow up of incidental findings seen on CT imaging. The research projects she leads, listed below, are typically collaborative, involving researchers from diverse clinical areas and who offer diverse methodological expertise.

RESEARCH AWARDS

Current

PI	07/02/2014 - 06/30/2019
NIH	\$1,140,000 direct/yr1
CT DOSE Collaboration: Partnership for Dose	\$7,900,000 total

Collaboration across the US and Europe to standardize and optimize the doses used for CT. The study uses a novel randomized controlled trial design to compare simple feedback to a multicomponent intervention as strategies to optimize doses. There are approximately 125 hospitals participating in the trial.

PI	09/02/2013 - 08/31/2016
PCORI (Patient Centered Outcomes Research Institute)	\$492,163 direct/yr1
CT Radiation Dose Registry to Ensure a Patient Centered Approach for Imaging	\$2,069,365 total

Collaboration across the US and Europe to create benchmarks and standards for CT by pooling data from a large number of hospitals and outpatient facilities

PI	3/01/2015- 02/28/2020
NIH	\$1,834,410 direct/yr1
Risk of Cancer in Childhood Associated with Medical Imaging	\$10,600,000 total

Retrospective cohort across large integrated health care systems to assess imaging in pregnant women and children and to quantify the risk of childhood and adolescent cancer associated with these exposures.

PI (co-PI with Gould, Kaiser Foundation Research)	4/01/2015- 03/30/2020
PCORI	
Pragmatic Trial of More versus Less Intensive Strategies for Surveillance of Patients with Small Pulmonary Nodules	\$14,458,936 total

Prospective comparative effectiveness study across 15 health care systems to compare different strategies for the surveillance of lung nodules. The study is novel in that patients will be recruited with routine clinical care at imaging and the creation of systematic quality improvement strategies to ensure no loss to follow up.

Past

PI	10/01/2010 - 09/30/2013
AHRQ	\$4,830,368 direct/yr1
RCT of US versus CT for Patients with Suspected Renal Colic	\$9,210,000 total

15 Center randomized pragmatic comparative effectiveness trial comparing different strategies for imaging patients with suspected kidney stones. The study exceeded enrollment and follow up targets, and the primary results were published in the NEJM in 2014. Many additional analyses are ongoing using these data.

PI	09/01/2008 - 07/31/2015
NIH K24	\$172,000 direct/yr1
Mid-Career Development Award: Risk of Cancer Associated with Incidental Findings	\$868,632 total

PI	07/01/2011 - 07/01/2014
University of California Office of the President, CHQI	\$250,000 direct/yr1
Standardization and Optimization of CT Radiation Dose	\$750,000 total

Across the University of California Medical Centers.

Five-center observational study to collect radiation data across the five University of California campuses using automated techniques, analyze the sources of variation in dose, and conduct quality improvement initiatives to standardize practice

PI	09/30/2012 - 09/29/2014
CDC (Centers for Disease Control and Prevention)	\$250,000 direct/yr1
PEDS CT-DOSE: Pediatric CT Dose Optimization and Standardization Endeavor	\$500,000 total

Ten center observational study to collect radiation data and create benchmarks in children

Co-Investigator (PI Solberg, Health Partners)	07/01/2012 - 06/30/2014
PCORI (Patient Centered Outcomes Research Institute)	\$250,000 direct/yr1
Measuring Patient Outcome from High Tech Imaging Studies	\$500,000 total

Mixed methods study to understand imaging use, positive rates of imaging and patient perspectives on imaging, with respect to identifying patient centered outcomes important to patients.

PI	04/01/2009 - 03/31/2011
NIH / R21	\$317,000 total
Risk of Cancer with Incidental Findings Identified on US Imaging	

Retrospective cohort to understand cancer risks of incidental findings

PI	09/01/2008 - 08/31/2010
NIH / R21	\$317,000 total
Radiation Exposure from Imaging: are Doses in a Carcinogenic Range	

Retrospective cohort to understand use of medical imaging within integrated health care systems

PI	10/01/1999 - 07/01/2005
DOD	\$725,515 total
Outcomes of Screening Mammography in Elderly Women	

Medicare Data were analyzed to determine utilization of mammography and factors influencing survival

PI	09/01/1999 - 06/01/2005
NIH K07	\$635,687 total
Outcomes of Screening Mammography in Elderly Women	

NIH Career development award to study breast cancer screening among elderly women.

PI	07/01/2003 - 02/01/2007
California Breast Cancer Research Program	\$583,287 total
Racial Disparity in Breast Cancer Mortality	

Retrospective cohort to understand the causes for racial disparity in breast cancer outcomes

Co-Investigator (PI Kerlikowske UCSF) 04/01/2000 - 03/31/2005
NIH, U01 **\$3,100,000 total**
San Francisco Mammography Registry: A Research Resource

Dr. Smith-Bindman project lead on 1) Physician Predictors of Mammography Accuracy and 2) Validation of the Medicare Screening Algorithm

Co-Investigator (PI – McCune, UCSF) 09/30/2006 - 06/30/2011
NIH
Clinical and Translational Science Institute (CTSI)

The grant is to enhance training and infrastructure across UCSF. I participate in the Biomedical Informatics Program to educate trainees about imaging, epidemiology and study design

Co-Investigator (PI- Lu, UCSF) 04/01/2006 - 03/01/2009
NIH
Statistical Methods for Evaluation and Validation of Tests

Co-Investigator (PI Tlsty, UCSF)) 10/01/2005 - 09/30/2010
NIH
Biological Basis of Breast Density and Breast Cancer Risk

Co-Investigator (PI Esserman, UCSF) 05/01/2003 - 04/30/2007
Department of Defense/USAMRC **\$6,900,000 total**
Blueprint for Regional Excellence in Breast Cancer Care

PI 01/01/2002 - 12/01/2006
Women's Health Research Center, UCSF **\$70,000 total**
Down Syndrome Screening in the US

PI 04/01/2001 - 04/01/2003
Society of Radiologists in Ultrasound **\$40,000 total**
Prenatal Ultrasound for Detection of Birth Defects and Chromosome Abnormalities

PI 04/01/2001 - 04/01/2004
Society of Radiologists in Ultrasound **\$30,000 total**
Physician Variation in Ultrasound Accuracy

PI 07/01/2000 - 06/01/2001 **\$40,000 direct/yr**
Society of North America
U.S. U.K Comparison of The Accuracy of Screening Mammography

P
I 07/07/1999 - 06/01/2000 **\$35,000 direct**
Radiologic Society of North America
Prenatal diagnostic ultrasound for the detection of chromosomal Abnormalities

MOST SIGNIFICANT RESEARCH PUBLICATIONS

- 1) **Smith-Bindman et al. Endovaginal ultrasound to evaluate endometrial abnormalities JAMA 1999**
Vaginal bleeding affects 7% of post-menopausal women, and historically women have undergone an invasive endometrial biopsy to exclude a diagnosis of cancer. This meta-analytic review found that endovaginal ultrasound is an easily tolerated non-invasive test that is accurate for the diagnosis of cancer, so that most women can avoid the need for an endometrial biopsy if they have a normal ultrasound test result. These results have been integrated into clinical practice guidelines in the US, Scotland, England, Germany, and Hong Kong. The publication has been cited 427 times based on SCOPUS accessed in 2015.
- 2) **Smith-Bindman et al. Second-trimester ultrasound to detect fetuses with Down syndrome: a meta-analysis. JAMA. 2001.**
Prenatal ultrasound is widely used to screen for Down syndrome, but the impact on patients has not been well studied. This meta-analytic review suggests that the use of ultrasound for the detection of fetuses affected by Down syndrome may be associated with more harm than benefit, as it can lead to large numbers of unnecessary amniocenteses and subsequent fetal losses with little evidence of benefits. This article was accompanied by extensive media coverage (AP, Reuters, NY Times), and controversy, and prompted discussion regarding the role of ultrasound in prenatal diagnoses. The manuscript has been cited 217 times based on SCOPUS accessed in 2015.
- 3) **Smith-Bindman R et al. US-UK Comparison of Screening Mammography. JAMA 2003.**
Screening mammography is an imprecise test, and there are considerable differences between physicians and programs in the accuracy of screening. This international comparison of screening mammography described 5.5 million mammograms obtained between 1996 to 1999 within three large-scale mammography registries or screening programs. Recall rates and open surgical biopsy rates were twice as high in the U.S. as in the U.K., although cancer rates were nearly identical. There was extensive media coverage (AP, Reuters, NY Times, Wall Street Journal, National Public Radio). These results have been widely cited, and were included in the IOM Report, "Saving Women's Lives." The publication was cited 223 times based on SCOPUS accessed in 2015.
- 4) **Smith-Bindman et al. Physician Predictors of Mammographic Accuracy. J Natl Cancer Inst 2005.**
Beyond the issues raised about the collective quality of mammographic screening in the United States, even more pronounced concern is the glaring variation among U.S. physicians in the ability to accurately interpretation their patients' mammograms. Dr. Smith-Bindman studied the accuracy of mammographic screening among 208 U.S. physicians, who collectively interpreted 1.2 million mammograms, and she found extraordinary variation in the interpretive abilities of radiologists; the sensitivity spanned 29% to 97%, while the false positive rate (the percentage of women who did not have cancer, but who underwent additional diagnostic testing or biopsy at their physician's recommendation) ranged from 1 to 29%. The difference in accuracy was principally due to differences in their training, experience and dedication to screening mammography; in short, the more experienced mammographers - and those who read more than the minimum number of mammograms required by MQSA guidelines - did substantially better. These findings have already been integrated into the Institute of Medicine's report on Mammography Quality Standards, regarding Enhancement of Interpretative Performance. The manuscript was cited 82 times based on SCOPUS accessed in 2015.
- 5) **Smith-Bindman et al. Does Utilization of Screening Mammography Explain Racial and Ethnic Differences in Breast Cancer? Ann Intern Med, 2006**
Racial and ethnic minorities tend to have larger, more advanced stage breast cancers at diagnosis than white women, and African American women have significantly higher breast cancer mortality. It has not been clear, however, if this is due to inherent differences in biology or the utilization of screening mammography. This paper sought to disentangle whether biology or the use of screening was largely responsible for the known racial and ethnic differences in breast cancer. This study was

unique in that detailed cancer information was available from tumor registries that were linked with detailed information regarding mammography utilization. The results were striking. Most of the racial and ethnic differences in breast cancer features were reduced or eliminated after accounting for the frequency of mammography screening. The manuscript was cited 175 times on SCOPUS.

6) **Smith-Bindman et al. Second trimester prenatal ultrasound for the detection of pregnancies at increased risk of Down syndrome. Prenat Diagn 2007** *Prenatal ultrasound is widely used to screen for Down syndrome, but the impact on patients has not been well studied. Our meta-analytic review found that ultrasound was not useful and this prompted our large prospective study which evaluated ultrasound in a larger cohort, including nearly 20,000 women, in whom nearly 500 had fetuses affected by Down syndrome. This large study confirmed these preliminary results. The manuscript was cited 51 times on SCOPUS.*

7) **Smith-Bindman et al. Radiation dose associated with common computed tomography examinations and the associated lifetime attributable risk of cancer. JAMA Internal Medicine 2009** *This paper documented the variation in doses associated with routine CT. The widespread media attention that this paper received contributed to active policy discussion in this area. I was invited to present and discuss the results at the FDA, at a Congressional Hearing sponsored by the Health Subcommittee of the Committee on Energy and Commerce, and innumerable professional society meetings, and submitted (and had endorsed) a measure of quality around CT imaging by the National Quality Forum. The manuscript was cited 857 times based on SCOPUS accessed in 2015.*

8) **Smith-Bindman R, Appendix F. Ionizing Radiation Exposure to the US Population, with a Focus on Radiation from Medical Imaging, in Breast and the Environment: A Life Course Approach. The Institute of Medicine. 2012** *The IOM was commissioned to write a report on environmental causes of breast cancer. The Komen Foundation commissioned the report. I was asked to summarize what is known about the harmful effects of ionizing radiation on breast cancer risks. The IOM concluded that ionizing radiation is one of the largest, and the most preventable causes of breast cancer.*

9) **Miglioretti DL et al. Smith-Bindman senior author. The use of computed tomography in pediatrics and the associated radiation exposure and estimated cancer risk. JAMA Pediatr. 2013** *Using a retrospective cohort design, this paper quantified the use of imaging among children within one of 7 large integrated health care systems, quantified the radiation exposure associated with these examinations, and estimated the likely impact of improved standardization of the conduct of CT on the risks of cancer. The manuscript concluded that if the top outlying radiation exposures could be reduced to the average (a modest goal) that 40% of expected cancer could be eliminated. The manuscript was cited 150 times based on SCOPUS accessed in 2015*

10) **Smith-Bindman R, et al. Risk of Thyroid Cancer based on Thyroid Ultrasound Imaging Characteristic: Result of A Population Based-Study. JAMA Internal Medicine. 2013.** *This retrospective observational study documented the risk of cancer associated with specific thyroid imaging findings. This is the first study that links a large cohort of patients with detailed imaging findings, with a comprehensive tumor registry to permit the quantification of the risk of cancer associated with specific findings. The results suggest that the number of biopsies can be reduced by up to 90%, with a relatively small impact on cancer detected. The results are being rapidly embraced by endocrinologists, surgeons and radiologists.*

11) **Smith-Bindman et al Ultrasound versus Computed Tomography for Suspected Nephrolithiasis NEJM. 2014.** *This 15-center randomized comparative effectiveness study assessed whether ultrasound or CT should be the first imaging test in patients with suspected kidney stones. The study is unique in using a rigorous randomized trial design to assess a diagnostic imaging test, and in assessing a broad range of outcomes other than diagnostic accuracy. Emergency department patients with abdominal pain and suspected nephrolithiasis*

were randomly assigned to one of three arms for imaging: ultrasound performed by an emergency medicine physician, ultrasound provided by a radiologist, or computerized tomography (CT). No significant differences were observed over the next 6 months in rates of severe serious adverse events (SAEs), related SAEs, or total SAEs, or ED or hospital admission rates at 7 or 30 days; however, initial imaging with ultrasound was associated with lower 1 day and 6-month cumulative radiation exposures than initial imaging with CT. The manuscript was cited 45 times based on SCOPUS accessed in 2015

PUBLICATIONS

Peer Reviewed

1. Block JE, **Smith R**, Black D, Tenant HK. Does Exercise Prevent Osteoporosis? JAMA 1987 257:3115-3117.
2. Genant HK, Block JE, Steiger P, Glueer CC, **Smith R**. Quantitative Computed Tomography in Assessment of Osteoporosis. Sem in Nuclear Med 4 1987:316-333.
3. Genant HK, Steiger P, Block JE, **Smith R**, Black D, Ettinger B, Harris ST. Rate of change in bone mineral content as measured by QCT, DPA and SPA in postmenopausal women. J Bone Miner Res 1987 25; 212.
4. Ettinger B, Block JE, **Smith R**, Cummings SR, Harris ST, Genant HK. An examination of the association between vertebral deformities, physical disabilities and psychosocial problems. Maturitas 1988 10:283-96.
5. Block JE, **Smith R**, Glueer CC, Steiger P, Ettinger B, Genant HK. Models of Spinal Trabecular Bone Loss as Determined by Quantitative Computed Tomography. J Bone Miner Res 1989 4:249-57.
6. **Smith-Bindman R**, Cummings SR, Steiger P, Genant HK. A comparison of morphometric definitions of vertebral fractures. J Bone Miner Res 1991 6:25-34.
7. **Smith-Bindman R**, Steiger P, Cummings SR, Genant HK. The Index of Radiographic Area (IRA): a new approach for estimating the severity of vertebral deformity. Bone and Mineral 1991 15:137-50
8. **Smith-Bindman R**, Kerlikowske K, Feldstein V, Subak L, Scheidler J, Segal M, Brand R, Grady D. Endovaginal ultrasound to exclude endometrial cancer and other endometrial abnormalities: a meta- analytic review. JAMA 1998 280:1510-1517
9. **Smith-Bindman, R**, Kerlikowske K, Feldstein V. Endovaginal ultrasound to evaluate endometrial abnormalities. JAMA 1999 281:1693-4.
10. Vincoff N, Callen P, **Smith-Bindman R**, Goldstein R. Effect of transducer frequency on the appearance of the fetal bowel. J Ultrasound Med 1999 18:799-803
11. **Smith-Bindman R**, Gebretsadik T, Kerlikowske K, Newman J. Is screening mammography effective in elderly women? Am J Med 2000 108:112-118, 2000

12. **Smith-Bindman R**, Hosmer W, Feldstein VA, Deeks JJ, Goldberg JD. Second-trimester ultrasound to detect fetuses with Down syndrome: a meta-analysis. JAMA 2001 285 (8):1044-55.
13. **Smith-Bindman R**, Hosmer W, Coppanigro M, Cunningham G. The variability in the interpretation of prenatal diagnostic ultrasound. Ultrasound Obstet Gynecol 2001 17:(4):326-332.
14. Goldstein RB, Bree RL, Benson CB, Benacerraf BR, Bloss JD, Carlos R, Fleischer AC, Goldstein SR, Hunt RB, Kurman RJ, Kurtz AB, Laing FC, Parsons AK, **Smith-Bindman R**, Walker J. Evaluation of woman with postmenopausal bleeding: Society of Radiologists in Ultrasound Consensus Conference Statement. J Ultrasound Med 2001 20 10;1025-1036.
15. **Smith-Bindman R**, Feldstein V, Goldberg JD. The Genetic Sonogram in Screening for Down Syndrome, J Ultrasound Med 2001 (20);1153-5.
16. **Smith-Bindman R**, Chu P, Ecker J, Feldstein V, Filly R, Bacchetti P. US evaluation of fetal growth: prediction of neonatal outcomes. Radiology 2002 223(1):153-161.
17. Shepherd JA, Kerlikowske K, **Smith-Bindman R**, Genant H, Cummings SR. Measurement of breast density with dual X-ray absorptiometry: feasibility. Radiology 2002 223(5): 554-557.
18. Prevrhal S, Shepherd JA, **Smith-Bindman R**, Kerlikowske K, Cummings SR. Accuracy of Mammographic Breast Density analysis: Results of Formal Operator Training. J Cancer, Epi. Bio. & Prev 2002 11(11); 1389-93.
19. **Smith-Bindman R**, Chu PW, Miglioretti DL, Sickles EA, Blanks R, Ballard-Barbash R, Bobo JK, Lee NC, Wallis MG, Patnick J, Kerlikowske K. Comparison of Screening Mammography in the US and the UK. JAMA 2003 290(16):2129-37.
20. **Smith-Bindman R**, Chu P, Bacchetti P, Waters JJ, Mutton D, Alberman E. Prenatal screening for Down syndrome in England and Wales and population-based birth outcomes. Am J Obstet Gynecol 2003 189(4):980-5.
21. **Smith-Bindman R**, Chu P, Ecker J, Feldstein V, Bacchetti P, Filly R. Adverse birth outcomes in relation to prenatal sonographic measurements of fetal size. J Ultrasound Med 2003 Apr 22:347-356.
22. Kerlikowske K, **Smith-Bindman R**, Barclay J, Ling BM, Grady D. Evaluation of Abnormal Mammography Results and Palpable Breast Abnormalities. Ann Intern Med 2003 139(4):274-84.
23. Ziv E, Shepherd J, **Smith-Bindman R**, Kerlikowske K. Mammographic Breast Density and Family History of Breast Cancer. J Natl Cancer Inst 2003 95(7) 556-558.
24. **Smith-Bindman R**, Weiss E, Feldstein V. How thick is too thick? What endometrial thickness should prompt biopsy in an asymptomatic postmenopausal woman? Ultrasound Obstet Gynecol, 2004 June; 24:558-565

25. **Smith-Bindman R.** Diagnostic Imaging in the Differential Diagnosis of Vaginal Bleeding and Breast Mass. Adv Stud Med 2004 (9):476-482.
26. Ziv E, Tice J, **Smith-Bindman R**, Shepherd J, Cummings S, Kerlikowske K. Mammographic density and estrogen receptor status of breast cancer. Cancer Epidemiol Biomarkers Prev 2004 13 (12):2090-5
27. Benn PA, Egan JF, Fang M, **Smith-Bindman R**. Changes in the utilization of prenatal diagnosis. Obstet Gynecol 2004 103(6):1255-60.
28. **Smith-Bindman R**, Chu P, Miglioretti D, Quale C, Rosenberg R, Cutter G, Geller B, Bacchetti P, Sickles E, Kerlikowske K. Physician Predictors of Mammographic Accuracy. J Natl Cancer Inst 2005 97:358-67
29. Kerlikowske K, **Smith-Bindman R**, Abraham LA, Lehman CD, Yankaskas BC, Ballard Barbash R, Barlow WE, Voeks JH, Geller BM, Carney PA, Sickles EA. Breast Cancer Yield for Screening Mammographic Examinations with Recommendation for Short-Interval Follow-up. Radiology 2005 234(3):684-692.
30. **Smith-Bindman R**, Ballard-Barbash R, Miglioretti D, Patnick J, Kerlikowske K. Comparing the Performance of Mammography Screening in the United States and the United Kingdom. J Med Screen 2005 12(1): 50-54.
31. Sickles EA, Miglioretti D, Ballard-Barbash R, Geller B, Leung J, Rosenberg R, **Smith-Bindman R**, Yankaskas B. Performance Benchmarks for Diagnostic Mammography. Radiology 2005 235(3):775-90
32. Kerlikowske K, Creasman J, Leung JW, **Smith-Bindman R**, Ernster VL. Differences in screening outcomes among White, Chinese, and Filipino women. Arch Intern Med. 2005 165(16):1862-8
33. Haggstrom DA, Quale C, **Smith-Bindman R**. Differences in the Quality of Breast Cancer Care Among Vulnerable Populations. Cancer. 2005 Dec 1;104(11):2347-58.
34. **Smith-Bindman R**, Miglioretti D, Lurie N, Abraham L, Ballard Barbash R, Strzelczyk J, Dignan M, Barlow W, Beasley C, Kerlikowske K. Does Utilization of Screening Mammography Explain Racial and Ethnic Differences in Breast Cancer? Ann Intern Med. 2006 144(8):541-53.
35. **Smith-Bindman R**, Quale C, Chu PW, Rosenberg R, Kerlikowske K. Can Medicare Billing Claims Data Be Used to Assess Mammography Utilization Among Women Age 65 and Older. Medical Care 2006 44(5):463-70
36. Kado DM, Christianson L, Palermo L **Smith-Bindman R**, Cummings SR, Greendale GA. Comparing a supine radiologic versus standing clinical measurement of kyphosis in older women: The Fracture Intervention Trial Spine 2006 31:4;4463-467.
37. Kagay C, Quale C, **Smith-Bindman**. Mammography Use Among the American Elderly," Am J Prev Med 2006 Aug;31(2):142-9

38. Schell MJ, Yankaskas BC, Ballard-Barbash R, Qaqish BF, Barlow WE, Rosenberg RD, **Smith-Bindman R**. Evidence-based target recall rates for screening mammography. Radiology 2007;243(3):681-9
39. **Smith-Bindman R**, Chu P, Goldberg JD. Second trimester prenatal ultrasound for the detection of pregnancies at increased risk of Down Syndrome. Prenat Diagn 2007;27(6):535-44.
40. Kerlikowske K, Ichikawa L, Miglioretti DL, Buist DS, Vacek PM, **Smith-Bindman R**, Yankaskas B, Carney PA, Ballard-Barbash R; National Institutes of Health Breast Cancer Surveillance Consortium. Longitudinal measurement of clinical mammographic breast density to improve estimation of breast cancer risk. J Natl Cancer Inst 2007;99(5):386-95
41. Carrell D, Miglioretti D, **Smith-Bindman R**, Coding free text radiology reports using the Cancer Text Information Extaction System (caTIES). _ AMIA Annu Symp Proc. 2007 11:889.
42. Miglioretti DL, **Smith-Bindman R**, Abraham L, Brenner RJ, Carney PA, Bowles EJ, Buist DS, Elmore JG Radiologist Predictors of the Interpretive Performance of Diagnostic Mammography. J Natl Cancer Inst 2007 10;99(24):1854-63
43. Curtis E, Quale C, Haggstrom D, **Smith-Bindman R**. Racial and Ethnic Differences in Breast Cancer Survival: How Much Is Explained by Screening, Tumor Severity, Biology, Treatment, and Co-morbidities. Cancer 2008 112(1):171
44. **Smith-Bindman R**, Miglioretti DL, Rosenberg R, Reid RJ, Taplin SH, Geller BM, Kerlikowske K; National Institutes of Health Breast Cancer Surveillance Consortium. Physician workload in mammography. Am J Roentgenol. 2008 Feb;190(2):526-32.
45. Dinkelspiel E, Chu P, **Smith-Bindman R**, Access to Diagnostic Mammography in the San Francisco Bay Area. Journal of Women's Health 2008 17(5):893-9
46. Goldman L, Haneuse S, Miglioretti D, Kerlikowske K, Buist D, Yankaskas B, **Smith-Bindman R**, An assessment of the quality of mammography care at facilities treating medically vulnerable populations Medical Care 2008 46(7):701-8.
47. Tice JA, Cummings SR, **Smith-Bindman R**, Ichikawa L, Barlow WE, Kerlikowske K. Using clinical factors and mammographic breast density to estimate breast cancer risk: development and validation of a new predictive model. Ann Intern Med 2008 Mar 4;148(5):337-47.
48. Scheuler K, Chu B, **Smith-Bindman R**. Factors Associated with Mammography Utilization: A Quantitative Meta-Analytic Review. Journal of Women's Health 2008 November 17 (9); 1477-98.
49. **Smith-Bindman R**, Miglioretti D, Larson E. Utilization of diagnostic medical imaging in a large integrated healthcare system: modality and organ system trends. Health Aff (Millwood). 2008 27(6):1491-502.
50. Venkatesan A, Chu P, Kerlikowske K, **Smith-Bindman R** The positive predictive value of specific mammographic findings according to reader and patient variables. Radiology 2009 50(3):648-57.

51. Cho R, Chu B, **Smith-Bindman R**. Second Trimester prenatal ultrasound for the detection of pregnancies at increased risk for Trisomy 18. Prenatal Diagnosis 2009 29(2):129-39
52. Cummings SR, Browner WB, Tice JA, Bauer S, Cuzick J, ivE, Vogel V, Shepherd J, Vachon C, **Smith-Bindman R**, Kerlikowske K. Prevention of Breast Cancer in Postmenopausal Women: Approaches to Estimating and Reducing Risk. J Natl Cancer Inst. 2009 101(6):384-98
53. **Smith-Bindman R**, Lipson J, Marcus R, Kim KP, Mahesh M, Gould R, Berrington de González A, Miglioretti DL. Radiation dose associated with common computed tomography examinations and the associated lifetime attributable risk of cancer. Archives of Internal Medicine 2009;169(22):2078-86.
54. **Smith-Bindman R**, McCulloch CE, Ding A, Quale C, Chu PW. Diagnostic imaging rates for head injury in the ED and states' medical malpractice tort reforms. Am J Emerg Med. 2011 Jul;29(6):656-64
55. Taplin S, Abraham LA, Geller B, Barlow WE, Buist DSM, **Smith-Bindman R**, Lehman C, Harvey S, Weaver D, Yankaskas BC. The effect of previous benign breast biopsy on the interpretive performance of subsequent screening mammography. Journal of the National Cancer Institute. 2010 102(14):1040-51.
56. Levine D, Brown DL, Andreotti RF, Benacerraf B, Benson CB, Brewster WR, Coleman B, Depriest P, Doubilet PM, Goldstein SR, Hamper UM, Hecht JL, Horrow M, Hur HC, Marnach M, Patel MD, Platt LD, Puscheck E, **Smith-Bindman R**. Management of asymptomatic ovarian and other adnexal cysts imaged at US: Society of Radiologists in Ultrasound Consensus Conference Statement. Radiology. 256(3):943-54.
57. Stengel JW, Webb EM, Poder L, Yeh BM, **Smith-Bindman R**, Coakley FV. Acute appendicitis: clinical outcome in patients with an initial false-position CT diagnosis. Radiology. 2010 256(1):119-26.
58. **Smith-Bindman R**. Is computed tomography safe? N Engl J Med. 2010 Jul 1;363(1):1-4.
59. Levine D, Brown DL, Andreotti RF, Benacerraf B, Benson CB, Brewster WR, Coleman B, DePriest P, Doubilet PM, Goldstein SR, Hamper UM, Hecht JL, Horrow M, Hur HC, Marnach M, Patel MD, Platt LD, Puscheck E, **Smith-Bindman R**; Management of asymptomatic ovarian and other adnexal cysts imaged at US Society of Radiologists in Ultrasound consensus conference statement. Society of Radiologists in Ultrasound. Ultrasound Q. 2010 26(3):121-31.
60. Berrington de Gonzalez A, Kim KP, **Smith-Bindman R**, McAreavey D. Myocardial perfusion scans: projected population cancer risks from current levels of use in the United States. Circulation. 2010 122(23):2403-10.
61. Goldman LE, Walker R, Miglioretti DL, **Smith-Bindman R**, Kerlikowske K; Accuracy of diagnostic mammography at facilities serving vulnerable women. National Cancer Institute Breast Cancer Surveillance Consortium. Med Care. 2011 49(1):67-75
62. Berrington de Gonzalez AB, Kim KP, Knudsen AB, Lansdorp-Vogelaar I, Rutter CM, **Smith-Bindman R**, Yee J, Kuntz KM, van Ballegooijen M, Zauber AG, Berg CD. Radiation-related

cancer risks from CT colonography screening: a risk-benefit analysis. Am J Roentgenol. 2011 196(4):816-23.

63. Mehta P, **Smith-Bindman R** Airport Full-Body Screening: What is the Risk? Arch Intern Med. 2011 171(12):1112-5
64. Rosenberg RD, Haneuse SJ, Geller BM, Buist DS, Miglioretti DL, Brenner RJ, **Smith-Bindman R**, Taplin SH; Breast Cancer Surveillance Consortium. Timeliness of follow-up after abnormal screening mammogram: variability of facilities. Radiology. 2011 261(2):404-13.
65. Miglioretti DL, **Smith-Bindman R** Overuse of computed tomography and associated risks. Am Fam Physician. 2011 83(11):1252-4.
66. Westphalen AC, Koff WJ, Coakley FV, Muglia VF, Neuhaus JM, Marcus RT, Kurhanewicz J, **Smith-Bindman R**. Prostate cancer: prediction of biochemical failure after external-beam radiation therapy--Kattan nomogram and endorectal MR imaging estimation of tumor volume. Radiology. 2011 261(2):477-86.
67. Goldman LE, Walker R, Miglioretti DL, **Smith-Bindman R**, Kerlikowske AK; Breast Cancer Surveillance Consortium. Facility characteristics do not explain higher false-positive rates in diagnostic mammography at facilities serving vulnerable women. Med Care. 2012 50(3):210-6.
68. **Smith-Bindman R**, Miglioretti DL, Johnson E, Lee C, Feigelson HS, Flynn M, Greenlee RT, Kruger RL, Hornbrook MC, Roblin D, Solberg LI, Vanneman N, Weinmann S, Williams AE. Use of diagnostic imaging studies and associated radiation exposure for patients enrolled in large integrated health care systems, 1996-2010. JAMA. 2012 Jun 13;307(22):2400-9.
69. **Smith-Bindman R**. Environmental causes of breast cancer and radiation from medical imaging: findings from the Institute of Medicine report. Arch Intern Med. 2012 172(13):1023-7.
70. Bach PB, Mirkin JN, Oliver TK, Azzoli CG, Berry DA, Brawley OW, Byers T, Colditz GA, Gould MK, Jett JR, Sabichi AL, **Smith-Bindman R**, Wood DE, Qaseem A, Detterbeck FC. Benefits and harms of CT screening for lung cancer: a systematic review. JAMA 307(22):2418-29.
71. Fenton JJ, Zhu W, Balch S, **Smith-Bindman R**, Lindfors KK, Hubbard RA. External validation of Medicare claims codes for digital mammography and computer-aided detection. Cancer Epidemiol Biomarkers Prev. 2012 Aug 23(8):1344-7.
72. Fazel R, Curtis J, Wang Y, Einstein AJ, **Smith-Bindman R**, Tsai TT, Chen J, Shah ND, Krumholz HM, Nallamothu BK. Determinants of fluoroscopy time for invasive coronary angiography and percutaneous coronary intervention: Insights from the NCDR. Catheter Cardiovasc Interv. 2013 82(7):1091-105
74. Miglioretti DL, Johnson E, William SA, Grenlee RT, Weinmann S, Solberg LI, Feigelson HS, Roblin D, Flynn MJ, Vanneman N, **Smith-Bindman R**. The use of computed tomography in pediatrics and the associated radiation exposure and estimated cancer risk. JAMA Pediatr. 2013 167 (88): 700-7

75. **Smith-Bindman R**, Lebda P, Feldtein VA, Sellami D, Goldstein RB, Brasic N, Jin C, Kornak J. Risk of Thyroid Cancer based on Thyroid Ultrasound Imaging Characteristic: Result of A Population Based-Study. JAMA Internal Medicine. 2013 173(19):1788-96
76. Keegan J, Miglioretti DL, Gould R, Donnelly LF, **Smith-Bindman R**, Wilson ND. Radiation Dose Metrics in Computed Tomography: Assessing Dose Using the National Quality Forum CT Patient Safety Measure. J Am Coll Radiol. 2014 11(3):309-15.
77. Fenton JJ, Zhu W, Balch S, **Smith-Bindman R**, Fishman P, Hubbard RA. Med Care. Distinguished Screening from Diagnostic Mammograms Using Medicare Claims Data. Med Care. 2014 52(7):e44-51
78. Miglioretti DL, Zhang Y, Johnson E, Lee C, Morin RL, Vanneman N, **Smith-Bindman R**. Personalized Technologist Dose Audit Feedback for Reducing Patient Radiation Exposure from CT. J Am Coll Radiol. 2014 11(3):300-8.
79. Lee CS, Reinhardt EB, **Smith-Bindman R**. CTSim: An Interactive Computer Simulation to Learn the Fundamentals of CT Dose Optimization. J Am Coll Radiol. 2014 11(3):255-6.
80. Wilson N, Valencia V, **Smith-Bindman R**. Virtual Meetings: Improving Impact and Accessibility of CME. J Am Coll Radiol. 2014 11(3):231-2.
81. **Smith-Bindman R**, Boone JM. Radiation Dose Optimization-Improving the Safety of CT. J Am Coll Radiol. 2014 11(3):229-30.
82. Valencia V, Moghadassi M, Kriesel DR, Cummings S, **Smith-Bindman R**. Study of Tomography Of Nephrolithiasis Evaluation (STONE): Methodology, approach and rationale. Contemp Clin Trials. 2014 38(1):92-101
83. **Smith-Bindman R**, Aubin C, Bailitz J, Bengiamin RN, Camargo CA Jr, Corbo J, Dean AJ, Goldstein RB, Griffey RT, Jay GD, Kang TL, Kriesel DR, Ma OJ, Mallin M, Manson W, Melnikow J, Miglioretti DL, Miller SK, Mills LD, Miner JR, Moghadassi M, Noble VE, Press GM, Stoller ML, Valencia VE, Wang J, Wang RC, Cummings SR. Ultrasound versus Computed Tomography for Suspected Nephrolithiasis. N Engl J Med. 2014 371(12):1100-10.
84. Hubbard RA, Benjamin-Johnson R, Onega T, **Smith-Bindman R**, Zhu W, Fenton JJ. Classification accuracy of claims-based methods for identifying providers failing to meet performance targets. Stat Med. 2015 15;34(1):93-105
85. **Smith-Bindman R**, Appendix F. Ionizing Radiation Exposure to the US Population, with a Focus on Radiation from Medical Imaging, in Breast and the Environment: A Life Course Approach. The Institute of Medicine. 2012
86. **Smith-Bindman R**, Moghadassi M, Griffey RT, Camargo CA Jr, Bailitz J, Beland M, Miglioretti DL. Computed Tomography Radiation Dose in Patients with Suspected Urolithiasis. JAMA Intern Med. 2015 Aug;175(8):1413-6
87. **Smith-Bindman R**, Moghadassi M, Wilson N, Nelson TR, Boone JM, Cagnon CH, Gould R, Hall DJ, Krishnam M, Lamba R, McNitt-Gray M, Seibert A, Miglioretti DL. Radiation Doses in

Consecutive CT Examinations from Five University of California Medical Centers. Radiology. 2015 277(1):134-41.

88. Hubbard RA, Benjamin-Johnson R, Onega T, **Smith-Bindman R**, Zhu W, Fenton JJ. Classification accuracy of claims-based methods for identifying providers failing to meet performance targets. Stat Med. 2015 15;34(1):93-105.
89. **Smith-Bindman R**. CT Radiation and the Risk of Cancer. Current Radiology Reports. 2015 3:3
90. Mongan J, Kline J, **Smith-Bindman R**. Age and sex-dependent trends in pulmonary embolism testing and derivation of a clinical decision rule for young patients. Emerg Med J. 2015 32(11):840-5
91. Bahadori A, Miglioretti D, Kruger R, Flynn M, Weinmann S, **Smith-Bindman R**, Lee C. Calculation of Organ Doses for a Large Number of Patients Undergoing CT Examinations. Am J Roentgenol. 2015 205(4):827-33.
92. Solberg LI, Asche SE, Butler J, Carrell D, Norton CK, Jarvik JG, **Smith-Bindman R**, Tillema JO, Whitebird RR, Ziegenfuss JY. The Effect of Achieving Patient-Reported Outcome Measures on Satisfaction. J Am Board Fam Med. 2015 Nov-Dec;28(6):785-92.
93. Burke LMB, Semelka RC, **Smith-Bindman R**. Trends of CT Utilization in North America over the last decade. Current Radiology Reports, January 2015 3:78
94. Melnikow J, Xing G, Cox G, Leigh P, Mills L, Miglioretti DL, Moghadassi M, **Smith-Bindman R**. Cost Analysis of the STONE Randomized Trial: Can Health Care Costs be Reduced One Test at a Time? Med Care. 2016 54(4):337-42.
95. Morgan TA, **Smith-Bindman R**, Harbell J, Kornak J, Stock PG, Feldstein VA. US Findings in Patients at Risk for Pancreas Transplant Failure. Radiology. 2016 280(1):281-9.
96. Wang RC, Bent S, Weber E, Neilson J, **Smith-Bindman R**, Fahimi J. The Impact of Clinical Decision Rules on Computed Tomography Use and Yield for Pulmonary Embolism: A Systematic Review and Meta-analysis. Ann Emerg Med. 2016 67(6):693-701.
97. Harrison JD, Balonov M, Martin CJ, Ortiz Lopez P, Menzel HG, Simmonds JR, **Smith-Bindman R**, Wakeford R. Use of effective dose. Ann ICRP. 2016 45(1 Suppl):215-24.
98. **Smith-Bindman R**, Bindman AB. Imaging More Wisely. JAMA Intern Med. 2016 176(2):168-70.
99. Wang RC, Rodriguez RM, Moghadassi M, Noble V, Bailitz J, Mallin M, Corbo J, Kang TL, Chu P, Shiboski S, **Smith-Bindman R**. External Validation of the STONE Score, a Clinical Prediction Rule for Ureteral Stone: An Observational Multi-Institutional Study. Ann Emerg Med. 2016 67(4):423-432.e2.
100. Onega T, Goldman LE, Walker RL, Miglioretti DL, Buist DS, Taplin S, Geller BM, Hill DA, **Smith-Bindman R**. Facility Mammography Volume in Relation to Breast Cancer Screening Outcomes. J Med Screen. 2016 23(1):31-7.

101. Fenton JJ, Onega T, Zhu W, Balch S, **Smith-Bindman R**, Henderson L, Sprague BL, Kerlikowske K, Hubbard RA. Validation of a Medicare Claims-based Algorithm for Identifying Breast Cancers Detected at Screening Mammography. Med Care. 2016;54(3).
102. Demb J, Chu P, Nelson T, Hall D, Seibert A, Lamba R, Boone J, Krishnam M, Cagnon C, Bostani M, Gould R, Miglioretti D, **Smith-Bindman R**. Optimizing Radiation Doses for Computed Tomography Across Institutions: Dose Auditing and Best Practices. JAMA Intern Med. 2017 177(6):810-817.
103. Wang RC, Addo N, Chi T, Moore C, Mallin M, Shiboski S, Stoller M, **Smith-Bindman R**. Medical expulsive therapy use in emergency department patients diagnosed with ureteral stones. Am J Emerg Med. 2017 35(8):1069-1074.
104. Wang RC, Rodriguez RM, Fahimi J, Hall MK, Shiboski S, Chi T, **Smith-Bindman R**. Derivation of decision rules to predict clinically important outcomes in acute flank pain patients. Am J Emerg Med. 2017 35(4):554-563.
105. Metzler IS, **Smith-Bindman R**, Moghadassi M, Wang RC, Stoller ML, Chi T. Emergency Department Imaging Modality Effect on Surgical Management of Nephrolithiasis: A Multicenter, Randomized Clinical Trial. J Urol. 2017 197(3 Pt 1):710-714.
106. Wang RC, **Smith-Bindman R**, Whitaker E, Neilson J, Allen IE, Stoller ML, Fahimi J. Effect of Tamsulosin on Stone Passage for Ureteral Stones: A Systematic Review and Meta-analysis. Ann Emerg Med. 2017 Mar;69(3):353-361
107. **Smith-Bindman R**, Wang Y, Yellen-Nelson TR, Moghadassi M, Wilson N, Gould R, Seibert A, Boone JM, Krishnam M, Lamba R, Hall DJ, Miglioretti DL. Predictors of CT Radiation Dose and Their Effect on Patient Care: A Comprehensive Analysis Using Automated Data. Radiology. 2017 Jan;282(1):182-193.
108. **Smith-Bindman R**. Use of Advanced Imaging Tests and the Not-So-Incidental Harms of Incidental Findings. JAMA Intern Med. 2017 Dec 26.
109. **Smith-Bindman R**, Poder L, Johnson E, Miglioretti D. Risk of Malignant Ovarian Cancer Based on Ultrasound Findings in a Large Unselected Population JAMA Intern Med Published online November 12, 2018. doi:10.1001/jamainternmed.2018.5113
110. **Smith-Bindman R**, Yifei Wang Y, Chu P, Chung R, et al, International Variation in Radiation Dose For Computed Tomography. BMJ In press

Publications, Other (selected)

1. **Smith-Bindman R**. Positron emission tomography to evaluate lung lesions. JAMA. 2001 285(21):2711-2
2. **Smith-Bindman R**, Feldstein VA, Goldberg JD. The genetic sonogram in screening for Down syndrome. J Ultrasound Med. 2001 20(11):1153-8

- 3 **Smith-Bindman R**, Miglioretti DL. CTDIvol, DLP, and effective dose are excellent measures for use in CT quality improvement. Radiology. 2011 261(3):999
4. **Smith-Bindman R**. Ultrasonography vs. CT for suspected nephrolithiasis. N Engl J Med. 2014 Dec 25;371(26):2531
5. **Smith-Bindman R**, Miglioretti D. Cell-free DNA Analysis for Noninvasive Examination of Trisomy. N Engl J Med. 2015 Dec 24;373(26):2581.
6. Rita F. Redberg and Rebecca Smith-Bindman "We Are Giving Ourselves Cancer." Editorial. The New York Times 31 Jan. 2014, The New York ed.: A27. 30 Jan. 2014.
7. **Smith-Bindman R**, Bindman AB. Imaging More Wisely-Already At Work. JAMA Intern Med. 2016 176(6):870-1.
8. **Smith-Bindman R**, Kwan ML, Miglioretti DL. Who Gets to Decide? Radiology. 2016 278(2):635-6

Conference Abstracts

1. Smith-Bindman R, Kerlikowske K. Is there a downside to elderly women undergoing screening mammography? J Natl Cancer Inst 1999;18:1322-3.
2. Smith-Bindman, R, Kerlikowske, K, Feldstein, V. Endovaginal ultrasound to evaluate endometrial abnormalities JAMA 1999;281:1693-4.
3. Smith-Bindman R. Positron emission tomography to evaluate lung lesions JAMA 2001;285:2711-2.
4. Smith-Bindman, R, Goldberg, JD. Ultrasound markers of fetal Down syndrome. JAMA 2001;285:2858.
5. Smith-Bindman R, Feldstein V, Goldberg JD. The Genetic Sonogram in Screening For Down Syndrome, J Ultrasound Med 2001 Nov; 20(11):1153-8.
6. Kerlikowske K, Smith-Bindman R, Sickles EA. Short-interval follow-up mammography: are we doing the right thing? J Natl Cancer Inst 2003 Aug 6;95(15):1175-6.
7. Smith-Bindman R, Miglioretti D, Kerlikowske K. Comparison of screening mammography in the United States and the United Kingdom. JAMA. 2004 Feb 18;291(7):824.
8. Sellami D, Goldstein R, Feldstein V, Smith-Bindman R. Ultrasound Can Help Low-Risk Patients Avoid Invasive Thyroid Biopsy. American Roentgen Ray Society, 2009
9. Kamath A, Smith-Bindman R. CT radiation dose shows wide variance in Emergency Department, RSNA 2009

10. Chang JH, Rand L, Smith-Bindman. Second trimester prenatal ultrasound for the detection of fetal structural anomalies and their associated risk for chromosomal abnormalities. American Journal of Obstetrics and Gynecology Volume 201, Issue 6, Supplement (December 2009) and poster presentation. Society for Maternal-Fetal Medicine: 2010 30th Annual Meeting: The Pregnancy Meeting Chicago, IL; February 4, 2010
11. Rand L, Smith-Bindman R, Saadai P, Machin GA, Farmer DL, Feldstein VA. Monochorionic twin pregnancy outcomes: Impact of cord insertion sites. (IFMSS 2009, Brazil)
12. Rand L, Smith-Bindman R, Saadai P, Machin GA, Lee H, Farmer DL, Feldstein VA. Monochorionic twin pregnancy outcomes: Impact of arterio-arterial and veno-venous anastomoses. (IFMSS 2009, Brazil)
13. Rand L, Smith-Bindman R, Payam Saadai, Geoffrey Machin, Vickie Feldstein. Placental Predictors of Adverse Outcomes in Monochorionic twins. (SMFM 2010, Chicago)
14. Rand L, Smith-Bindman R, Saadai P, Machin GA, Feldstein VA. Natural History and Outcomes of Monochorionic Twin Pregnancies in a Large Population-Based Study. (SMFM 2010, Chicago)
15. Lebeda P, Feldstein V, Goldstein R, Sellami D, Smith-Bindman R. Risk of Thyroid Cancer Associated with Ultrasound Findings. Results from a population based study. Association of University Radiologists, 2011, Boston MA
16. Burger I, Miglioretti D, Johnson E, et al. Rise in Radiation Exposure from Diagnostic Imaging in Patients Across Several Different HMO Populations. Paper presented at: RSNA, December 2 20102010; Chicago, IL
17. Burger I, Miglioretti D, Johnson E, Vanneman N, Smith-Bindman R. Radiation Exposure Increased Dramatically in a Large Health Plan, Particularly Among Cancer Patients. Paper presented at: RSNA, December 1 20102010; Chicago, IL
18. Merry, MD et al. Breast Cancer Risk from Medical Imaging Including Computed Tomography (CT) and Nuclear Medicine among Females Enrolled in a Large Integrated health Care System – manuscript in preparation. Presented at the Radiological Society of North America Annual Meeting, Chicago, IL, 2012
19. Mongan, et al. Improving Efficiency of Pulmonary Embolism Testing in Young Female patients manuscript in preparation. Presented at the Radiological Society of North America Annual Meeting, Chicago, IL, 2012

Abstract Presentations at Scientific Meetings

Current CT doses from a Computed Tomography Dose Registry, presented at the *Conference on Radiation in Health, Radiation Research Society*, Kona, HI, 10/15-17, 2016

Current Exposure to Computed Tomography Imaging in US Integrated Health Care Systems, presented at the Conference on Radiation in Health by the Radiation Research Society, Kona, HI, 10/15-17, 2016

Current CT doses from a Computed Tomography Dose Registry in Pediatric Patients, Presented at the American Academy of Pediatrics Annual Meeting, San Francisco, CA, 10/22-25/2017

European Congress of Radiology, European Society of Radiology, 2017
Practical Strategies for Optimizing Dose, A Dose of Reality

European Congress of Radiology, European Society of Radiology, 2018
An International Randomized Controlled Trial of Two Interventions for Reducing Doses for Computed Tomography (CT) Through Audit Feedback and Sharing Best Practices

European Congress of Radiology, European Society of Radiology, 2018
International Variation in Radiation Dose for Computed Tomography (CT)

Exhibit B

- “A Survey of the Long-Term Effects of Talc and Kaolin Pleurodesis.” *British Journal of Diseases of the Chest* 73 (1979): 285–88. [https://doi.org/10.1016/0007-0971\(79\)90054-8](https://doi.org/10.1016/0007-0971(79)90054-8).
- Acencio, Milena M. P., Evaldo Marchi, Lisete R. Teixeira, Bruna Rocha Silva, Juliana Sanchez Silva, Carlos Sergio Rocha Silva, Vanessa Adelia Alvarenga, Leila Antonangelo, Francisco Suso Vargas, and Vera Luiza Capelozzi. “Talc Particles and Pleural Mesothelium Interface Modulate Apoptosis and Inflammation.” *Pathology* 46, no. S2 (2014): S76.
- Acheson, E D, M J Gardner, E C Pippard, and L P Grime. “Mortality of Two Groups of Women Who Manufactured Gas Masks from Chrysotile and Crocidolite Asbestos: A 40-Year Follow-Up.” *British Journal of Industrial Medicine* 39, no. 4 (November 1982): 344–48.
- Akhtar, Mohd Javed, Maqsood Ahamed, M.A. Majeed Khan, Salman A. Alrokayan, Iqbal Ahmad, and Sudhir Kumar. “Cytotoxicity and Apoptosis Induction by Nanoscale Talc Particles from Two Different Geographical Regions in Human Lung Epithelial Cells.” *Environmental Toxicology* 29 (2014): 394–406. <https://doi.org/10.1002/tox.21766>.
- Akhtar, Mohd Javed, Sudhir Kumar, Ramesh Chandra Murthy, Mohd Ashquin, Mohd Imran Khan, Govil Patil, and Iqbal Ahmad. “The Primary Role of Iron-Mediated Lipid Peroxidation in the Differential Cytotoxicity Caused by Two Varieties of Talc Nanoparticles on A549 Cells and Lipid Peroxidation Inhibitory Effect Exerted by Ascorbic Acid.” *Toxicology in Vitro: An International Journal Published in Association with BIBRA* 24, no. 4 (June 2010): 1139–47. <https://doi.org/10.1016/j.tiv.2010.03.002>.
- American Cancer Society. “Key Statistics for Ovarian Cancer,” n.d. <https://www.cancer.org/cancer/ovarian-cancer/about/key-statistics.html>.
- . “What Is Ovarian Cancer?,” n.d. <https://www.cancer.org/cancer/ovarian-cancer/about/what-is-ovarian-cancer.html>.
- Anderson, Garnet L., Howard L. Judd, Andrew M. Kaunitz, David H. Barad, Shirley A. A. Beresford, Mary Pettinger, James Liu, S. Gene McNeeley, Ana Maria Lopez, and Women’s Health Initiative Investigators. “Effects of Estrogen plus Progestin on Gynecologic Cancers and Associated Diagnostic Procedures: The Women’s Health Initiative Randomized Trial.” *JAMA* 290, no. 13 (October 1, 2003): 1739–48. <https://doi.org/10.1001/jama.290.13.1739>.
- Antoniou, A., P. D. P. Pharoah, S. Narod, H. A. Risch, J. E. Eyfjord, J. L. Hopper, N. Loman, et al. “Average Risks of Breast and Ovarian Cancer Associated with BRCA1 or BRCA2 Mutations Detected in Case Series Unselected for Family History: A Combined Analysis of 22 Studies.” *American Journal of Human Genetics* 72, no. 5 (May 2003): 1117–30.
- Arellano-Orden, Elena, Auxiliadora Romero-Falcon, Jose Martin Juan, Manuel Ocana Jurado, Francisco Rodriguez-Panadero, and Ana Montes-Worboys. “Small Particle-Size Talc Is Associated with Poor Outcome and Increased Inflammation in Thoracoscopic Pleurodesis.” *Respiration* 86 (2013): 201–9. <https://doi.org/10.1159/000342042>.
- Armstrong, Deborah K., Brian Bundy, Lari Wenzel, Helen Q. Huang, Rebecca Baergen, Shashikant Lele, Larry J. Copeland, Joan L. Walker, Robert A. Burger, and Gynecologic Oncology Group. “Intraperitoneal Cisplatin and Paclitaxel in Ovarian Cancer.” *The New England Journal of Medicine* 354, no. 1 (January 5, 2006): 34–43. <https://doi.org/10.1056/NEJMoa052985>.
- “ATSDR - Toxicological Profile: Asbestos.” Accessed August 16, 2018. <https://www.atsdr.cdc.gov/toxprofiles/tp.asp?id=30&tid=4>.
- Baldwin, Lauren A., Bin Huang, Rachel W. Miller, Thomas Tucker, Scott T. Goodrich, Iwona Podzielinski, Christopher P. DeSimone, Fred R. Ueland, John R. van Nagell, and Leigh G. Seamon. “Ten-Year Relative Survival for Epithelial Ovarian Cancer.” *Obstetrics & Gynecology* 120, no. 3 (September 2012): 612–18. <https://doi.org/10.1097/AOG.0b013e318264f794>.

- Balkwill, Fran, and Alberto Mantovani. "Inflammation and Cancer: Back to Virchow?" *The Lancet* 357, no. 9255 (February 2001): 539–45. [https://doi.org/10.1016/S0140-6736\(00\)04046-0](https://doi.org/10.1016/S0140-6736(00)04046-0).
- Beck, B. D., H. A. Feldman, J. D. Brain, T. J. Smith, M. Hallock, and B. Gerson. "The Pulmonary Toxicity of Talc and Granite Dust as Estimated from an in Vivo Hamster Bioassay." *Toxicology and Applied Pharmacology* 87, no. 2 (February 1987): 222–34.
- Begg, Melissa D., and Dana March. "Cause and Association: Missing the Forest for the Trees." *American Journal of Public Health* 108, no. 5 (May 2018): 620. <https://doi.org/10.2105/AJPH.2018.304366>.
- Belotte, Jimmy, Nicole M. Fletcher, Awoniyi O. Awonuga, Mitchell Alexis, Husam M. Abu-Soud, Ghassan M. Saed, Michael P. Diamond, and Mohammed G. Saed. "The Role of Oxidative Stress in the Development of Cisplatin Resistance in Epithelial Ovarian Cancer." *Reproductive Sciences* 21, no. 4 (2014): 503–8. <https://doi.org/10.1177/1933719113503403>.
- Belotte, Jimmy, Nicole M. Fletcher, Mohammed G. Saed, Mohammed S. Abusamaan, Gregory Dyson, Michael P. Diamond, and Ghassan M. Saed. "A Single Nucleotide Polymorphism in Catalase Is Strongly Associated with Ovarian Cancer Survival." *PloS One* 10, no. 8 (2015). <https://doi.org/e0135739>. doi:10.1371/journal.pone.0135739.
- Berge, Wera, Kenneth Mundt, Hung Luu, and Paolo Boffetta. "Genital Use of Talc and Risk of Ovarian Cancer: A Meta-Analysis." *European Journal of Cancer Prevention*, January 2017, 1. <https://doi.org/10.1097/CEJ.0000000000000340>.
- . "Genital Use of Talc and Risk of Ovarian Cancer: A Meta-Analysis." *European Journal of Cancer Prevention: The Official Journal of the European Cancer Prevention Organisation (ECP)* 27, no. 3 (2018): 248–57. <https://doi.org/10.1097/CEJ.0000000000000340>.
- Berry, G., M. L. Newhouse, and J. C. Wagner. "Mortality from All Cancers of Asbestos Factory Workers in East London 1933-80." *Occupational and Environmental Medicine* 57, no. 11 (November 2000): 782–85.
- Bertolotti, Marinella, Daniela Ferrante, Dario Mirabelli, Mario Botta, Marinella Nonnato, Annalisa Todesco, Benedetto Terracini, and Corrado Magnani. "[Mortality in the cohort of the asbestos cement workers in the Eternit plant in Casale Monferrato (Italy)]." *Epidemiologia E Prevenzione* 32, no. 4–5 (October 2008): 218–28.
- Blank, M M, N Wentzensen, M A Murphy, A Hollenbeck, and Y Park. "Dietary Fat Intake and Risk of Ovarian Cancer in the NIH-AARP Diet and Health Study." *British Journal of Cancer* 106, no. 3 (January 31, 2012): 596–602. <https://doi.org/10.1038/bjc.2011.572>.
- Blount, A M. "Amphibole Content of Cosmetic and Pharmaceutical Talcs." *Environmental Health Perspectives* 94 (August 1991): 225–30.
- Bluemel, Piza, and Zischka-Konorsa, W. "Animal experimental investigations of tissue reactions to starch and talcum powder after intraperitoneal application." *Wiener klinische Wochenschrift* 74, no. 1 (January 1962).
- Blumenkrantz, M. J., N. Gallagher, R. A. Bashore, and H. Tenckhoff. "Retrograde Menstruation in Women Undergoing Chronic Peritoneal Dialysis." *Obstetrics and Gynecology* 57, no. 5 (May 1981): 667–70.
- Boorman, G. A., and J. C. Seely. "The Lack of an Ovarian Effect of Lifetime Talc Exposure in F344/N Rats and B6C3F1 Mice." *Regulatory Toxicology and Pharmacology: RTP* 21, no. 2 (April 1995): 242–43. <https://doi.org/10.1006/rtph.1995.1035>.
- Booth, M., V. Beral, and P. Smith. "Risk Factors for Ovarian Cancer: A Case-Control Study." *British Journal of Cancer* 60, no. 4 (October 1989): 592–98.

- Bottazzi, Barbara, Elio Riboli, and Alberto Mantovani. "Aging, Inflammation and Cancer." *Seminars in Immunology*, November 5, 2018. <https://doi.org/10.1016/j.smim.2018.10.011>.
- Bunderson-Schelman, Melisa, Jean C. Pfau, Robert Crouch, and Andrij Holian. "Nonpulmonary Outcomes of Asbestos Exposure." *Journal of Toxicology and Environmental Health. Part B, Critical Reviews* 14, no. 1–4 (2011): 122–52. <https://doi.org/10.1080/10937404.2011.556048>.
- Burn, John, Anne-Marie Gerdes, Finlay Macrae, Jukka-Pekka Mecklin, Gabriela Moeslein, Sylviane Olschwang, Diane Eccles, et al. "Long-Term Effect of Aspirin on Cancer Risk in Carriers of Hereditary Colorectal Cancer: An Analysis from the CAPP2 Randomised Controlled Trial." *Lancet (London, England)* 378, no. 9809 (December 17, 2011): 2081–87. [https://doi.org/10.1016/S0140-6736\(11\)61049-0](https://doi.org/10.1016/S0140-6736(11)61049-0).
- Buz'Zard, Amber R., and Benjamin H. S. Lau. "Pycnogenol® Reduces Talc-Induced Neoplastic Transformation in Human Ovarian Cell Cultures." *Phytotherapy Research* 21, no. 6 (June 2007): 579–86. <https://doi.org/10.1002/ptr.2117>.
- Caldwell, Carlyle G., White Thomas Aubrey, William L. George, and James J. Eberl. Medical dusting powder. United States US2626257A, filed May 21, 1952, and issued January 20, 1953. <https://patents.google.com/patent/US2626257A/en?q=medical&q=dusting+powder&oq=medical+dusting+powder>.
- Camargo, M. Constanza, Leslie T. Stayner, Kurt Straif, Margarita Reina, Umaina Al-Alem, Paul A. Demers, and Philip J. Landrigan. "Occupational Exposure to Asbestos and Ovarian Cancer: A Meta-Analysis." *Environmental Health Perspectives* 119, no. 9 (September 2011): 1211–17. <https://doi.org/10.1289/ehp.1003283>.
- Carr, C.J. "Talc: Consumer Uses and Health Perspectives" 21 (1995): 211–15.
- Chan, Andrew T., Edward L. Giovannucci, Jeffrey A. Meyerhardt, Eva S. Schernhammer, Gary C. Curhan, and Charles S. Fuchs. "Long-Term Use of Aspirin and Nonsteroidal Anti-Inflammatory Drugs and Risk of Colorectal Cancer." *JAMA* 294, no. 8 (August 24, 2005): 914–23. <https://doi.org/10.1001/jama.294.8.914>.
- Chang, Che-Jui, Yu-Kang Tu, Pau-Chung Chen, and Hsiao-Yu Yang. "Occupational Exposure to Talc Increases the Risk of Lung Cancer: A Meta-Analysis of Occupational Cohort Studies." *Canadian Respiratory Journal*, 2017. <https://doi.org/10.1155/2017/1270608>.
- Chang, Stella, and Harvey A. Risch. "Perineal Talc Exposure and Risk of Ovarian Carcinoma." *Cancer* 79, no. 12 (June 15, 1997): 2396–2401. [https://doi.org/10.1002/\(SICI\)1097-0142\(19970615\)79:12<2396::AID-CNCR15>3.0.CO;2-M](https://doi.org/10.1002/(SICI)1097-0142(19970615)79:12<2396::AID-CNCR15>3.0.CO;2-M).
- Chen, F., K. Gaitskell, M. J. Garcia, A. Albukhari, J. Tsaltas, and A. A. Ahmed. "Serous Tubal Intraepithelial Carcinomas Associated with High-Grade Serous Ovarian Carcinomas: A Systematic Review." *BJOG: An International Journal of Obstetrics and Gynaecology* 124, no. 6 (May 2017): 872–78. <https://doi.org/10.1111/1471-0528.14543>.
- Chen, Lee-May, and Jonathan S Berek. "Overview of Epithelial Carcinoma of the Ovary, Fallopian Tube, and Peritoneum." *UpToDate*, 2018.
- Chen, L-M, et al. "Epithelial Carcinoma of the Ovary, Fallopian Tube, and Peritoneum: Epidemiology and Risk Factors - UpToDate," 2018. https://www.uptodate.com/contents/epithelial-carcinoma-of-the-ovary-fallopian-tube-and-peritoneum-epidemiology-and-risk-factors?search=Epithelial%20carcinoma%20of%20the%20ovary,%20fallopian%20tube,%20and%20peritoneum:%20Epidemiology%20and%20risk%20factors&source=search_result&selectedTitle=1~150&usage_type=default&display_rank=1.
- Chen, Xi, Gerd A. Müller, Marianne Quaas, Martin Fischer, Namshik Han, Benjamin Stutchbury, Andrew D. Sharrocks, and Kurt Engeland. "The Forkhead Transcription Factor FOXM1

- Controls Cell Cycle-Dependent Gene Expression through an Atypical Chromatin Binding Mechanism.” *Molecular and Cellular Biology* 33, no. 2 (January 2013): 227–36.
<https://doi.org/10.1128/MCB.00881-12>.
- Chen, Y., P. C. Wu, J. H. Lang, W. J. Ge, P. Hartge, and L. A. Brinton. “Risk Factors for Epithelial Ovarian Cancer in Beijing, China.” *International Journal of Epidemiology* 21, no. 1 (February 1992): 23–29.
- Chien, Jeremy, Hugues Sicotte, Jian-Bing Fan, Sean Humphray, Julie M. Cunningham, Kimberly R. Kalli, Ann L. Oberg, et al. “TP53 Mutations, Tetraploidy and Homologous Recombination Repair Defects in Early Stage High-Grade Serous Ovarian Cancer.” *Nucleic Acids Research* 43, no. 14 (August 18, 2015): 6945–58. <https://doi.org/10.1093/nar/gkv111>.
- Chittenden, B. G., G. Fullerton, A. Maheshwari, and S. Bhattacharya. “Polycystic Ovary Syndrome and the Risk of Gynaecological Cancer: A Systematic Review.” *Reproductive Biomedicine Online* 19, no. 3 (September 2009): 398–405.
- Cibula, D., M. Widschwendter, O. Májek, and L. Dusek. “Tubal Ligation and the Risk of Ovarian Cancer: Review and Meta-Analysis.” *Human Reproduction Update* 17, no. 1 (January 1, 2011): 55–67. <https://doi.org/10.1093/humupd/dmq030>.
- Cibula, David, Martin Widschwendter, Michael Zikan, and Ladislav Dusek. “Underlying Mechanisms of Ovarian Cancer Risk Reduction after Tubal Ligation.” *Acta Obstetrica Et Gynecologica Scandinavica* 90, no. 6 (June 2011): 559–63. <https://doi.org/10.1111/j.1600-0412.2011.01114.x>.
- CIMBA, Georgia Chenevix-Trench, Roger L Milne, Antonis C Antoniou, Fergus J Couch, Douglas F Easton, and David E Goldgar. “An International Initiative to Identify Genetic Modifiers of Cancer Risk in BRCA1 and BRCA2 Mutation Carriers: The Consortium of Investigators of Modifiers of BRCA1 and BRCA2 (CIMBA).” *Breast Cancer Research* 9, no. 2 (December 2007). <https://doi.org/10.1186/bcr1670>.
- Cohen, Samuel M., and Lora L. Arnold. “Chemical Carcinogenesis.” *Toxicological Sciences* 120, no. suppl_1 (March 1, 2011): S76–92. <https://doi.org/10.1093/toxsci/kfq365>.
- Colditz, Graham A. “Cancer Prevention.” *UpToDate*, 2018.
- Collaborative Group on Epidemiological Studies of Ovarian Cancer, V. Beral, R. Doll, C. Hermon, R. Peto, and G. Reeves. “Ovarian Cancer and Oral Contraceptives: Collaborative Reanalysis of Data from 45 Epidemiological Studies Including 23,257 Women with Ovarian Cancer and 87,303 Controls.” *Lancet* 371, no. 9609 (January 26, 2008): 303–14.
[https://doi.org/10.1016/S0140-6736\(08\)60167-1](https://doi.org/10.1016/S0140-6736(08)60167-1).
- Collaborative Group On Epidemiological Studies Of Ovarian Cancer, V. Beral, K. Gaitskell, C. Hermon, K. Moser, G. Reeves, and R. Peto. “Menopausal Hormone Use and Ovarian Cancer Risk: Individual Participant Meta-Analysis of 52 Epidemiological Studies.” *Lancet (London, England)* 385, no. 9980 (May 9, 2015): 1835–42. [https://doi.org/10.1016/S0140-6736\(14\)61687-1](https://doi.org/10.1016/S0140-6736(14)61687-1).
- Committee on Practice Bulletins–Gynecology, Committee on Genetics, Society of Gynecologic Oncology. “Practice Bulletin No 182: Hereditary Breast and Ovarian Cancer Syndrome.” *Obstetrics and Gynecology* 130, no. 3 (2017): e110–26.
<https://doi.org/10.1097/AOG.0000000000002296>.
- Compton, Sarah A., Sezgin Ozgür, and Jack D. Griffith. “Ring-Shaped Rad51 Paralog Protein Complexes Bind Holliday Junctions and Replication Forks as Visualized by Electron Microscopy.” *The Journal of Biological Chemistry* 285, no. 18 (April 30, 2010): 13349–56.
<https://doi.org/10.1074/jbc.M109.074286>.

- Cook, Linda S., Mary L. Kamb, and Noel S. Weiss. "Perineal Powder Exposure and the Risk of Ovarian Cancer." *American Journal of Epidemiology* 145, no. 5 (March 1, 1997): 459–65.
- Cook, LS. "Erratum in 'Perineal Powder Exposure and the Risk of Ovarian Cancer'." *American Journal of Epidemiology* 148, no. 410 (1997).
- Coussens, Lisa M., and Zena Werb. "Inflammation and Cancer." *Nature* 420, no. 6917 (December 19, 2002): 860–67. <https://doi.org/10.1038/nature01322>.
- Cralley, L. J., M. M. Key, D. H. Groth, W. S. Lainhart, and R. M. Ligo. "Fibrous and Mineral Content of Cosmetic Talcum Products." *American Industrial Hygiene Association Journal* 29, no. 4 (August 1968): 350–54. <https://doi.org/10.1080/00028896809343015>.
- Cramer, D. W. "Perineal Talc Exposure and Subsequent Epithelial Ovarian Cancer: A Case-Control Study." *Obstetrics and Gynecology* 94, no. 1 (July 1999): 160–61.
- Cramer, D. W., R. F. Liberman, L. Titus-Ernstoff, W. R. Welch, E. R. Greenberg, J. A. Baron, and B. L. Harlow. "Genital Talc Exposure and Risk of Ovarian Cancer." *International Journal of Cancer. Journal International Du Cancer* 81, no. 3 (May 5, 1999): 351–56.
- Cramer, D. W., W. R. Welch, R. E. Scully, and C. A. Wojciechowski. "Ovarian Cancer and Talc: A Case-Control Study." *Cancer* 50, no. 2 (July 15, 1982): 372–76.
- Cramer, Daniel W., Linda Titus-Ernstoff, John R. McKolanis, William R. Welch, Allison F. Vitonis, Ross S. Berkowitz, and Olivera J. Finn. "Conditions Associated with Antibodies Against the Tumor-Associated Antigen MUC1 and Their Relationship to Risk for Ovarian Cancer." *Cancer Epidemiology Biomarkers & Prevention* 14, no. 5 (May 1, 2005): 1125–31. <https://doi.org/10.1158/1055-9965.EPI-05-0035>.
- Cramer, Daniel W., Allison F. Vitonis, Kathryn L. Terry, William R. Welch, and Linda J. Titus. "The Association between Talc Use and Ovarian Cancer: A Retrospective Case-Control Study in Two US States." *Epidemiology (Cambridge, Mass.)*, December 17, 2015. <https://doi.org/10.1097/EDE.0000000000000434>.
- . "The Association Between Talc Use and Ovarian Cancer: A Retrospective Case-Control Study in Two US States." *Epidemiology (Cambridge, Mass.)* 27, no. 3 (May 2016): 334–46. <https://doi.org/10.1097/EDE.0000000000000434>.
- Cramer, Daniel W., William R. Welch, Ross S. Berkowitz, and John J. Godleski. "Presence of Talc in Pelvic Lymph Nodes of a Woman with Ovarian Cancer and Long-Term Genital Exposure to Cosmetic Talc." *Obstetrics and Gynecology* 110, no. 2 Pt 2 (August 2007): 498–501. <https://doi.org/10.1097/01.AOG.0000262902.80861.a0>.
- Cramer, Daniel W., William R. Welch, Robert E. Scully, and Carol A. Wojciechowski. "Ovarian Cancer and Talc. A Case-Control Study." *Cancer* 50, no. 2 (July 15, 1982): 372–76. [https://doi.org/10.1002/1097-0142\(19820715\)50:2<372::AID-CNCR2820500235>3.0.CO;2-S](https://doi.org/10.1002/1097-0142(19820715)50:2<372::AID-CNCR2820500235>3.0.CO;2-S).
- Crum, Christopher P, Jonathan Bijron, and Brooke E. Howitt. "Pathogenesis of Ovarian, Fallopian Tubal, and Peritoneal Serous Carcinomas." *UpToDate*, 2018.
- Crusz, Shanthini M., and Frances R Balkwill. "Inflammation and Cancer: Advances and New Agents." *Nature Reviews Clinical Oncology* 12 (October 2015): 584–96. <https://doi.org/10.1038/nrclinonc.2015.105>.
- Curtis D. Klaassen, and John Doull. *Casarett and Doull's Toxicology : The Basic Science of Poisons*. 8th Edition. McGraw-Hill Education, 2013. <https://www.ncbi.nlm.nih.gov/nlmcatalog/101586259>.
- Danforth, Kim N., Shelley S. Tworoger, Jonathan L. Hecht, Bernard A. Rosner, Graham A. Colditz, and Susan E. Hankinson. "Breastfeeding and Risk of Ovarian Cancer in Two Prospective

- Cohorts.” *Cancer Causes & Control: CCC* 18, no. 5 (June 2007): 517–23.
<https://doi.org/10.1007/s10552-007-0130-2>.
- “Deposition & Exhibits of John Hopkins, PhD, MDL No. 2738.” In re: Talcum Power Prod. Liab. Litig., August 16, 2018.
- “Deposition & Exhibits of Julie Pier, MDL No. 2738.” In re: Talcum Power Prod. Liab. Litig., September 12, 2018.
- “Deposition of Alice M. Blount, Ph.D., Circuit Court of the City of St. Louis State of Missouri, Case No.: 1522-CC10417-01,” April 13, 2018.
- Devaja, Omer. *Ovarian Cancer From Pathogenesis to Treatment*. IntechOpen, 2018.
- Ding, Yuan C., Lesley McGuffog, Sue Healey, Eitan Friedman, Yael Laitman, Shani- Paluch-Shimon, Bella Kaufman, et al. “A Nonsynonymous Polymorphism in IRS1 Modifies Risk of Developing Breast and Ovarian Cancers in BRCA1 and Ovarian Cancer in BRCA2 Mutation Carriers.” *Cancer Epidemiology, Biomarkers & Prevention: A Publication of the American Association for Cancer Research, Cosponsored by the American Society of Preventive Oncology* 21, no. 8 (August 2012): 1362–70. <https://doi.org/10.1158/1055-9965.EPI-12-0229>.
- Dixon, Suzanne C., Christina M. Nagle, Nicolas Wentzensen, Britton Trabert, Alicia Beeghly-Fadiel, Joellen M. Schildkraut, Kirsten B. Moysich, et al. “Use of Common Analgesic Medications and Ovarian Cancer Survival: Results from a Pooled Analysis in the Ovarian Cancer Association Consortium.” *British Journal of Cancer* 116, no. 9 (April 25, 2017): 1223–28.
<https://doi.org/10.1038/bjc.2017.68>.
- Dodson, R. F., M. O’Sullivan, C. J. Corn, and S. P. Hammar. “Quantitative Comparison of Asbestos and Talc Bodies in an Individual with Mixed Exposure.” *American Journal of Industrial Medicine* 27, no. 2 (February 1995): 207–15.
- D.R. Petterson. “JNJ 000251888,” April 26, 1973.
- Dubeau, L., and R. Drapkin. “Coming into Focus: The Nonovarian Origins of Ovarian Cancer.” *Annals of Oncology: Official Journal of the European Society for Medical Oncology* 24 Suppl 8 (November 2013): viii28–35. <https://doi.org/10.1093/annonc/mdt308>.
- Eberl, J. J., and W. L. George. “Comparative Evaluation of the Effects of Talcum and a New Absorbable Substitute on Surgical Gloves.” *American Journal of Surgery* 75, no. 3 (March 1948): 493–97.
- Egli, G. E., and M. Newton. “The Transport of Carbon Particles in the Human Female Reproductive Tract.” *Fertility and Sterility* 12 (April 1961): 151–55.
- Eng, Kevin H., J. Brian Szender, John Lewis Etter, Jasmine Kaur, Samantha Poblete, Ruea-Yea Huang, Qianqian Zhu, et al. “Paternal Lineage Early Onset Hereditary Ovarian Cancers: A Familial Ovarian Cancer Registry Study.” *PLoS Genetics* 14, no. 2 (February 2018): e1007194.
<https://doi.org/10.1371/journal.pgen.1007194>.
- “Expert Report of Michael Crowley, Ph.D., In Re: Talcum Powder Prod. Liab. Litig., MDL No. 2738,” November 12, 2018.
- Fasching, Peter A., Simon Gayther, Leigh Pearce, Joellen M. Schildkraut, Ellen Goode, Falk Thiel, Georgia Chenevix-Trench, et al. “Role of Genetic Polymorphisms and Ovarian Cancer Susceptibility.” *Molecular Oncology* 3, no. 2 (April 2009): 171–81.
<https://doi.org/10.1016/j.molonc.2009.01.008>.
- Fathalla, M. F. “Incessant Ovulation and Ovarian Cancer - a Hypothesis Re-Visited.” *Facts, Views & Vision in ObGyn* 5, no. 4 (2013): 292–97.
- . “Incessant Ovulation--a Factor in Ovarian Neoplasia?” *Lancet* 2, no. 7716 (July 17, 1971): 163.

- FDA. "Ltr to Samuel S. Epstein, M.D., RE: Docket Numbers 94P-0420 and FDA-2008-P-0309-0001 /CP," April 1, 2017.
- Fedak, Kristen M., Autumn Bernal, Zachary A. Capshaw, and Sherilyn Gross. "Applying the Bradford Hill Criteria in the 21st Century: How Data Integration Has Changed Causal Inference in Molecular Epidemiology." *Emerging Themes in Epidemiology* 12, no. 14 (2015). <https://doi.org/10.1186/s12982-015-0037-4>.
- "Federal Register Vol. 81, No.243, December 19, 2016 FDA Ban on Surgical Gloves." Accessed August 16, 2018. <https://www.gpo.gov/fdsys/search/pagedetails.action?collectionCode=FR&browsePath=2016%2F12%2F12-19%5C%2F2%2FConsumer+Product+Safety+Commission&isCollapsed=true&leafLevelBrowse=true&packageId=FR-2016-12-19&isDocumentResults=true&ycord=173&isDocumentResults=true&ycord=173>.
- Ferguson, Lynnette R. "Chronic Inflammation and Mutagenesis." *Mutation Research* 690, no. 1–2 (August 7, 2010): 3–11. <https://doi.org/10.1016/j.mrfmmm.2010.03.007>.
- Fernandes, José Veríssimo, Ricardo Ney Oliveira Cobucci, Carlos André Nunes Jatobá, Thales Allyrio Araújo de Medeiros Fernandes, Judson Welber Veríssimo de Azevedo, and Josélio Maria Galvão de Araújo. "The Role of the Mediators of Inflammation in Cancer Development." *Pathology & Oncology Research* 21, no. 3 (July 2015): 527–34. <https://doi.org/10.1007/s12253-015-9913-z>.
- Ferrante, Daniela, Marinella Bertolotti, Annalisa Todesco, Dario Mirabelli, Benedetto Terracini, and Corrado Magnani. "Cancer Mortality and Incidence of Mesothelioma in a Cohort of Wives of Asbestos Workers in Casale Monferrato, Italy." *Environmental Health Perspectives* 115, no. 10 (October 2007): 1401–5. <https://doi.org/10.1289/ehp.10195>.
- Ferrer, Jaume, Juan F. Montes, Maria A. Villarino, Richard W. Light, and José García-Valero. "Influence of Particle Size on Extrapleural Talc Dissemination after Talc Slurry Pleurodesis." *Chest* 122, no. 3 (September 2002): 1018–27.
- Fiume, Monice M., Ivan Boyer, Wilma F. Bergfeld, Donald V. Belsito, Ronald A. Hill, Curtis D. Klaassen, Daniel C. Liebler, et al. "Safety Assessment of Talc as Used in Cosmetics." *International Journal of Toxicology* 34, no. 1 suppl (July 1, 2015): 66S-129S. <https://doi.org/10.1177/1091581815586797>.
- Fletcher, Nicole M., Jimmy Belotte, Mohammed G. Saed, Ira Memaj, Michael P. Diamond, Robert T. Morris, and Ghassan M. Saed. "Specific Point Mutations in Key Redox Enzymes Are Associated with Chemoresistance in Epithelial Ovarian Cancer." *Free Radical Biology and Medicine* 102 (2017): 122–32. <https://doi.org/10.1016/j.freeradbiomed.2016.11.028>.
- Fletcher, Nicole M., Zhongliang Jiang, Rouba Ali-Fehmi, Nancy K. Levin, Jimmy Belotte, Michael A. Tainsky, Michael P. Diamond, Husam M. Abu-Soud, and Ghassan M. Saed. "Myeloperoxidase and Free Iron Levels: Potential Biomarkers for Early Detection and Prognosis of Ovarian Cancer." *Cancer Biomarkers* 10 (2012 2011): 267–75. <https://doi.org/10.3233/CBM-2012-0255>.
- Fletcher, Nicole, Memaj, Ira, and Saed, Ghassan. "Talcum Powder Enhances Oxidative Stress in Ovarian Cancer Cells." *Reproductive Sciences*, February 28, 2018. <https://doi.org/10.1177/1933719118759999>.
- Fletcher, NM, and GM Saed. "Talcum Powder Enhances Cancer Antigen 125 Levels in Ovarian Cancer Cells." *Presented at the 65th Meeting of the Society for Reproductive Investigation, San Diego, California*, 2018.

- Folkins, Ann K., Elke A. Jarboe, Jonathan L. Hecht, Michael G. Muto, and Christopher P. Crum. "Chapter 24 - Assessing Pelvic Epithelial Cancer Risk and Intercepting Early Malignancy." In *Diagnostic Gynecologic and Obstetric Pathology (Third Edition)*, 844–64. Philadelphia: Content Repository Only!, 2018. <https://doi.org/10.1016/B978-0-323-44732-4.00024-8>.
- Ford, D., D.F. Easton, M. Stratton, S. Narod, D. Goldgar, P. Devilee, D.T. Bishop, et al. "Genetic Heterogeneity and Penetrance Analysis of the BRCA1 and BRCA2 Genes in Breast Cancer Families." *The American Journal of Human Genetics* 62, no. 3 (March 1998): 676–89. <https://doi.org/10.1086/301749>.
- Freedman, Ralph S, Michael Deavers, Jinsong Liu, and Ena Wang. "Peritoneal Inflammation – A Microenvironment for Epithelial Ovarian Cancer (EOC)." *Journal of Translational Medicine* 2, no. 23 (2004). <https://doi.org/10.1186/1479-5876-2-23>.
- Friebel, Tara M., Susan M. Domchek, and Timothy R. Rebbeck. "Modifiers of Cancer Risk in BRCA1 and BRCA2 Mutation Carriers: Systematic Review and Meta-Analysis." *Journal of the National Cancer Institute* 106, no. 6 (June 2014): dju091. <https://doi.org/10.1093/jnci/dju091>.
- Frost, G. "The Latency Period of Mesothelioma among a Cohort of British Asbestos Workers (1978–2005)." *British Journal of Cancer* 109, no. 7 (October 1, 2013): 1965–73. <https://doi.org/10.1038/bjc.2013.514>.
- Galea, Sandro, and Roger D. Vaughan. "Moving Beyond the Cause Constraint: A Public Health of Consequence, May 2018." *American Journal of Public Health* 108, no. 5 (May 2018): 602–3. <https://doi.org/10.2105/AJPH.2018.304390>.
- Gates, Margaret A., Bernard A. Rosner, Jonathan L. Hecht, and Shelley S. Tworoger. "Risk Factors for Epithelial Ovarian Cancer by Histologic Subtype." *American Journal of Epidemiology* 171, no. 1 (January 1, 2010): 45–53. <https://doi.org/10.1093/aje/kwp314>.
- Gates, Margaret A., Shelley S. Tworoger, Kathryn L. Terry, Linda Titus-Ernstoff, Bernard Rosner, Immaculata De Vivo, Daniel W. Cramer, and Susan E. Hankinson. "Talc Use, Variants of the GSTM1, GSTT1, and NAT2 Genes, and Risk of Epithelial Ovarian Cancer." *Cancer Epidemiology, Biomarkers & Prevention : A Publication of the American Association for Cancer Research, Cosponsored by the American Society of Preventive Oncology* 17, no. 9 (September 2008): 2436–44. <https://doi.org/10.1158/1055-9965.EPI-08-0399>.
- Genofre, Eduardo H., Francisco S. Vargas, Milena M. P. Acencio, Leila Antonangelo, Lisete R. Teixeira, and Evaldo Marchi. "Talc Pleurodesis: Evidence of Systemic Inflammatory Response to Small Size Talc Particles." *Respiratory Medicine* 103, no. 1 (January 2009): 91–97. <https://doi.org/10.1016/j.rmed.2008.07.021>.
- Germani, D., S. Belli, C. Bruno, M. Grignoli, M. Nesti, R. Pirastu, and P. Comba. "Cohort Mortality Study of Women Compensated for Asbestosis in Italy." *American Journal of Industrial Medicine* 36, no. 1 (July 1999): 129–34.
- Gertig, D. M., D. J. Hunter, D. W. Cramer, G. A. Colditz, F. E. Speizer, W. C. Willett, and S. E. Hankinson. "Prospective Study of Talc Use and Ovarian Cancer." *Journal of the National Cancer Institute* 92, no. 3 (February 2, 2000): 249–52.
- Ghio, Andrew J., Joleen M. Soukup, Lisa A. Dailey, Judy H. Richards, Jennifer L. Turi, Elizabeth N. Pavlisko, and Victor L. Roggli. "Disruption of Iron Homeostasis in Mesothelial Cells after Talc Pleurodesis." *American Journal of Respiratory Cell and Molecular Biology* 46, no. 1 (January 1, 2012): 80–86. <https://doi.org/10.1165/rcmb.2011-0168OC>.
- Gloyne, S. R. "Two Cases of Squamous Carcinoma of the Lung Occurring in Asbestosis." *Tubercle* 17 (1935): 5–10.

- Godard, B., W. D. Foulkes, D. Provencher, J. S. Brunet, P. N. Tonin, A. M. Mes-Masson, S. A. Narod, and P. Ghadirian. "Risk Factors for Familial and Sporadic Ovarian Cancer among French Canadians: A Case-Control Study." *American Journal of Obstetrics and Gynecology* 179, no. 2 (August 1998): 403–10.
- Gonzalez, Kelly D., Katie A. Noltner, Carolyn H. Buzin, Dongqing Gu, Cindy Y. Wen-Fong, Vu Q. Nguyen, Jennifer H. Han, et al. "Beyond Li Fraumeni Syndrome: Clinical Characteristics of Families with P53 Germline Mutations." *Journal of Clinical Oncology: Official Journal of the American Society of Clinical Oncology* 27, no. 8 (March 10, 2009): 1250–56.
<https://doi.org/10.1200/JCO.2008.16.6959>.
- Gonzalez, Nicole L., Katie M. O'Brien, Aimee A. D'Aloisio, Dale P. Sandler, and Clarice R. Weinberg. "Douching, Talc Use, and Risk of Ovarian Cancer." *Epidemiology (Cambridge, Mass.)* 27, no. 6 (2016): 797–802. <https://doi.org/10.1097/EDE.0000000000000528>.
- Goodman, Marc T, Galina Lurie, Pamela J Thompson, Katharine E McDuffie, and Michael E Carney. "Association of Two Common Single-Nucleotide Polymorphisms in the CYP19A1 Locus and Ovarian Cancer Risk." *Endocrine-Related Cancer* 15, no. 4 (December 2008): 1055–60.
<https://doi.org/10.1677/ERC-08-0104>.
- Gordon, Ronald E., Sean Fitzgerald, and James Millette. "Asbestos in Commercial Cosmetic Talcum Powder as a Cause of Mesothelioma in Women." *International Journal of Occupational and Environmental Health* 20, no. 4 (October 2014): 318–32.
<https://doi.org/10.1179/2049396714Y.00000000081>.
- Graham, J., and R. Graham. "Ovarian Cancer and Asbestos." *Environmental Research* 1, no. 2 (October 1967): 115–28.
- Graham, and Jenkins. "Value of Modified Starch as a Substitute for Talc." *Lancet (London, England)* 1, no. 6708 (March 22, 1952): 590–91.
- Green, A., D. Purdie, C. Bain, V. Siskind, P. Russell, M. Quinn, and B. Ward. "Tubal Sterilisation, Hysterectomy and Decreased Risk of Ovarian Cancer. Survey of Women's Health Study Group." *International Journal of Cancer. Journal International Du Cancer* 71, no. 6 (June 11, 1997): 948–51.
- Grivennikov, Sergei I., Florian R. Greten, and Michael Karin. "Immunity, Inflammation, and Cancer." *Cell* 140, no. 6 (March 19, 2010): 883–99. <https://doi.org/10.1016/j.cell.2010.01.025>.
- Gross, A. J., and P. H. Berg. "A Meta-Analytical Approach Examining the Potential Relationship between Talc Exposure and Ovarian Cancer." *Journal of Exposure Analysis and Environmental Epidemiology* 5, no. 2 (June 1995): 181–95.
- Hall, J. M., M. K. Lee, B. Newman, J. E. Morrow, L. A. Anderson, B. Huey, and M. C. King. "Linkage of Early-Onset Familial Breast Cancer to Chromosome 17q21." *Science (New York, N.Y.)* 250, no. 4988 (December 21, 1990): 1684–89.
- Halme, J., M. G. Hammond, J. F. Hulka, S. G. Raj, and L. M. Talbert. "Retrograde Menstruation in Healthy Women and in Patients with Endometriosis." *Obstetrics and Gynecology* 64, no. 2 (August 1984): 151–54.
- Hamilton, T. C., H. Fox, C. H. Buckley, W. J. Henderson, and K. Griffiths. "Effects of Talc on the Rat Ovary." *British Journal of Experimental Pathology* 65, no. 1 (February 1984): 101–6.
- Hankinson, S. E., D. J. Hunter, G. A. Colditz, W. C. Willett, M. J. Stampfer, B. Rosner, C. H. Hennekens, and F. E. Speizer. "Tubal Ligation, Hysterectomy, and Risk of Ovarian Cancer. A Prospective Study." *JAMA* 270, no. 23 (December 15, 1993): 2813–18.

- Hannenhalli, Sridhar, and Klaus H. Kaestner. "The Evolution of Fox Genes and Their Role in Development and Disease." *Nature Reviews. Genetics* 10, no. 4 (April 2009): 233–40. <https://doi.org/10.1038/nrg2523>.
- Harlow, B. L., D. W. Cramer, D. A. Bell, and W. R. Welch. "Perineal Exposure to Talc and Ovarian Cancer Risk." *Obstetrics and Gynecology* 80, no. 1 (July 1992): 19–26.
- Harlow, B. L., and P. A. Hartge. "A Review of Perineal Talc Exposure and Risk of Ovarian Cancer." *Regulatory Toxicology and Pharmacology: RTP* 21, no. 2 (April 1995): 254–60. <https://doi.org/10.1006/rtp.1995.1039>.
- Harlow, B. L., and N. S. Weiss. "A Case-Control Study of Borderline Ovarian Tumors: The Influence of Perineal Exposure to Talc." *American Journal of Epidemiology* 130, no. 2 (August 1989): 390–94.
- Harper, Amy K, and Ghassan Saed. "'Talc Induces a pro-Oxidant State in Normal and Ovarian Cancer Cells through Genetic Point Mutations in Key Redox Enzymes,'" Accepted for Presentation at SGO Meeting," In Press 2019.
- Hartge, P., R. Hoover, L. P. Leshner, and L. McGowan. "Talc and Ovarian Cancer." *JAMA: The Journal of the American Medical Association* 250, no. 14 (October 14, 1983): 1844.
- Hasselbalch, Hans Carl. "Chronic Inflammation as a Promotor of Mutagenesis in Essential Thrombocythemia, Polycythemia Vera and Myelofibrosis. A Human Inflammation Model for Cancer Development?" *Leukemia Research* 37, no. 2 (February 2013): 214–20. <https://doi.org/10.1016/j.leukres.2012.10.020>.
- Havrilesky, Laura J., Patricia G. Moorman, William J. Lowery, Jennifer M. Gierisch, Remy R. Coeytaux, Rachel Peragallo Urrutia, Michaela Dinan, et al. "Oral Contraceptive Pills as Primary Prevention for Ovarian Cancer: A Systematic Review and Meta-Analysis." *Obstetrics and Gynecology* 122, no. 1 (July 2013): 139–47. <https://doi.org/10.1097/AOG.0b013e318291c235>.
- Heller, D. S., R. E. Gordon, and N. Katz. "Correlation of Asbestos Fiber Burdens in Fallopian Tubes and Ovarian Tissue." *American Journal of Obstetrics and Gynecology* 181, no. 2 (August 1999): 346–47.
- Heller, D. S., R. E. Gordon, C. Westhoff, and S. Gerber. "Asbestos Exposure and Ovarian Fiber Burden." *American Journal of Industrial Medicine* 29, no. 5 (May 1996): 435–39. [https://doi.org/10.1002/\(SICI\)1097-0274\(199605\)29:5<435::AID-AJIM1>3.0.CO;2-L](https://doi.org/10.1002/(SICI)1097-0274(199605)29:5<435::AID-AJIM1>3.0.CO;2-L).
- Heller, D. S., C. Westhoff, R. E. Gordon, and N. Katz. "The Relationship between Perineal Cosmetic Talc Usage and Ovarian Talc Particle Burden." *American Journal of Obstetrics and Gynecology* 174, no. 5 (May 1996): 1507–10.
- Henderson, W. J., T. C. Hamilton, M. S. Baylis, C. G. Pierrepoint, and K. Griffiths. "The Demonstration of the Migration of Talc from the Vagina and Posterior Uterus to the Ovary in the Rat." *Environmental Research* 40, no. 2 (August 1986): 247–50.
- Henderson, W. J., C. A. Joslin, A. C. Turnbull, and K. Griffiths. "Talc and Carcinoma of the Ovary and Cervix." *The Journal of Obstetrics and Gynaecology of the British Commonwealth* 78, no. 3 (March 1971): 266–72.
- Hernán, Miguel A. "The C-Word: Scientific Euphemisms Do Not Improve Causal Inference From Observational Data." *American Journal of Public Health* 108, no. 5 (May 2018): 616–19. <https://doi.org/10.2105/AJPH.2018.304337>.
- Hill, Austin Bradford. "The Environment and Disease: Association or Causation?" *Proceedings of the Royal Society of Medicine* 58, no. 5 (May 1965): 295–300.
- Hillegass, Jedd M., Arti Shukla, Maximilian B. MacPherson, Jeffrey P. Bond, Chad Steele, and Brooke T. Mossman. "Utilization of Gene Profiling and Proteomics to Determine Mineral

- Pathogenicity in a Human Mesothelial Cell Line (LP9/TERT-1).” *Journal of Toxicology and Environmental Health. Part A* 73, no. 5 (January 2010): 423–36.
<https://doi.org/10.1080/15287390903486568>.
- Horowitz, Neil S., Austin Miller, Bunja Rungruang, Scott D. Richard, Noah Rodriguez, Michael A. Bookman, Chad A. Hamilton, Thomas C. Krivak, and G. Larry Maxwell. “Does Aggressive Surgery Improve Outcomes? Interaction between Preoperative Disease Burden and Complex Surgery in Patients with Advanced-Stage Ovarian Cancer: An Analysis of GOG 182.” *Journal of Clinical Oncology: Official Journal of the American Society of Clinical Oncology* 33, no. 8 (March 10, 2015): 937–43. <https://doi.org/10.1200/JCO.2014.56.3106>.
- Houghton, Serena C., Katherine W. Reeves, Susan E. Hankinson, Lori Crawford, Dorothy Lane, Jean Wactawski-Wende, Cynthia A. Thomson, Judith K. Ockene, and Susan R. Sturgeon. “Perineal Powder Use and Risk of Ovarian Cancer.” *Journal of the National Cancer Institute* 106, no. 9 (September 2014). <https://doi.org/10.1093/jnci/dju208>.
- Huncharek, Michael, J. F. Geschwind, and Bruce Kupelnick. “Perineal Application of Cosmetic Talc and Risk of Invasive Epithelial Ovarian Cancer: A Meta-Analysis of 11,933 Subjects from Sixteen Observational Studies.” *Anticancer Research* 23, no. 2C (April 2003): 1955–60.
- Huncharek, Michael, Joshua Muscat, Adedayo Onitilo, and Bruce Kupelnick. “Use of Cosmetic Talc on Contraceptive Diaphragms and Risk of Ovarian Cancer: A Meta-Analysis of Nine Observational Studies.” *European Journal of Cancer Prevention: The Official Journal of the European Cancer Prevention Organisation (ECP)* 16, no. 5 (October 2007): 422–29.
<https://doi.org/10.1097/01.cej.0000236257.03394.4a>.
- Hunn, Jessica, and Gustavo C. Rodriguez. “Ovarian Cancer: Etiology, Risk Factors, and Epidemiology.” *Clinical Obstetrics and Gynecology* 55, no. 1 (March 2012): 3–23.
<https://doi.org/10.1097/GRF.0b013e31824b4611>.
- IARC. “IARC Monographs on the Evaluation of Carcinogenic Risks to Humans – IARC : Asbestos,” 1977. <https://monographs.iarc.fr/iarc-monographs-on-the-evaluation-of-carcinogenic-risks-to-humans-79/>.
- . “IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, Volume 58. Beryllium, Cadmium, Mercury, and Exposures in the Glass Manufacturing Industry,” 1993.
- . “IARC Monographs on the Evaluation of Carcinogenic Risks to Humans Volume 93 Carbon Black, Titanium Dioxide, and Talc.” *IARC Monographs on the Evaluation of Carcinogenic Risks to Humans / World Health Organization, International Agency for Research on Cancer* 93 (2010): 1–413.
- . “IARC Monographs on the Evaluation of Carcinogenic Risks to Humans: Volume 100C,” 2012.
- . “IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans: Silica and Some Silicates.” IARC, 1987.
- . “IARC Monographs on the Evaluation of the Carcinogenic Risks to Humans. Overall Evaluations of Carcinogenicity: An Updating of IARC Monographs Volumes 1-42. Supplement 7,” 1987. <https://monographs.iarc.fr/wp-content/uploads/2018/06/Suppl7.pdf>.
- IARC, International Agency for Research on Cancer, and World Health Organization, eds. *Carbon Black, Titanium Dioxide, and Talc*. IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, v. 93. Lyon, France : Geneva: International Agency for Research on Cancer ; Distributed by WHO Press, 2010.
- “IMERYS 013188,” n.d.
- “IMERYS 088907 Rio Tinto Minerals HSE&EA Science Advisory Meeting.” September 17, 2007.

- “IMERYYS 284935,” n.d.
- “IMERYYS137677-IMERYYS137690,” 2004.
- “IMERYYS209971,” 1972.
- “IMERYYS210136,” n.d.
- “IMERYYS241866,” n.d.
- “IMERYYS248877,” n.d.
- “IMERYYS255101,” n.d.
- “IMERYYS255224,” n.d.
- “IMERYYS255384,” n.d.
- “IMERYYS255394,” n.d.
- “IMERYYS255395,” n.d.
- “IMERYYS279884,” n.d.
- “IMERYYS279968,” n.d.
- “IMERYYS281335,” n.d.
- “IMERYYS281776,” n.d.
- “IMERYYS324700,” n.d.
- “IMERYYS-A_0011817,” n.d.
- “Inflammation: A Hidden Path to Breaking the Spell of Ovarian Cancer.” *Cell Cycle* 8, no. 19 (2009): 3107–11.
- Institute of Medicine (US) Committee on Asbestos: Selected Health Effects. *Asbestos: Selected Cancers*. The National Academies Collection: Reports Funded by National Institutes of Health. Washington (DC): National Academies Press (US), 2006.
<http://www.ncbi.nlm.nih.gov/books/NBK20332/>.
- Isaacs, Claudine, and Beth N Peshkin. “Management of Patients at High Risk for Breast and Ovarian Cancer.” *UpToDate*, 2018.
- Iturralde, M., and P. F. Venter. “Hysterosalpingo-Radionuclide Scintigraphy (HERS).” *Seminars in Nuclear Medicine* 11, no. 4 (October 1981): 301–14.
- J. Lightfoot, G.A. Kingston, and F.D. Pooley. “An Examination of Italian Mine Samples and Relevant Powders,” 1972.
- Jaiswal, M., N. F. LaRusso, L. J. Burgart, and G. J. Gores. “Inflammatory Cytokines Induce DNA Damage and Inhibit DNA Repair in Cholangiocarcinoma Cells by a Nitric Oxide-Dependent Mechanism.” *Cancer Research* 60, no. 1 (January 1, 2000): 184–90.
- “JANSSEN-000056 P-23 (Pltf_MISC_00000321) Ortho Diaphragm Information,” n.d.
- Jaurand, M. C. “Mechanisms of Fiber-Induced Genotoxicity.” *Environmental Health Perspectives* 105 Suppl 5 (September 1997): 1073–84. <https://doi.org/10.1289/ehp.97105s51073>.
- . “Particulate-State Carcinogenesis: A Survey of Recent Studies on the Mechanisms of Action of Fibres.” *IARC Scientific Publications*, no. 90 (1989): 54–73.
- Jaurand, MC. “Mechanisms of Fibre Genotoxicity.” In *Mechanisms in Fibre Carcinogenesis*. New York: Plenum Press, 1991.
- Jervis, Sarah, Honglin Song, Andrew Lee, Ed Dicks, Jonathan Tyrer, Patricia Harrington, Douglas F. Easton, Ian J. Jacobs, Paul P. D. Pharoah, and Antonis C. Antoniou. “Ovarian Cancer Familial Relative Risks by Tumour Subtypes and by Known Ovarian Cancer Genetic Susceptibility Variants.” *Journal of Medical Genetics* 51, no. 2 (February 2014): 108–13.
<https://doi.org/10.1136/jmedgenet-2013-102015>.

- Jia, D, Y Nagaoka, S Orsulic, and M Katsumata. "Inflammation Is a Key Contributor to Ovarian Cancer Cell Seeding." *Scientific Reports* 8, no. 12394 (August 17, 2018).
<https://doi.org/10.1038/s41598-018-30261-8>.
- Jiang, Zhongliang, Nicole M. Fletcher, Rouba Ali-Fehmi, Michael P. Diamond, Husam M. Abu-Soud, Adnan R. Munkarah, and Ghassan M. Saed. "Modulation of Redox Signaling Promotes Apoptosis in Epithelial Ovarian Cancer Cells." *Gynecologic Oncology* 122, no. 2 (August 2011): 418–23. <https://doi.org/10.1016/j.ygyno.2011.04.051>.
- "JNJ000000704 P-396," n.d.
- "JNJ000011150," n.d.
- "JNJ000016645," n.d.
- "JNJ000019415," n.d.
- "JNJ000025132," 1976.
- "JNJ000025132," n.d.
- "JNJ000026987," n.d.
- "JNJ000046293," n.d.
- "JNJ000245678," n.d.
- "JNJ000245762," n.d.
- "JNJ000251888," n.d.
- "JNJ000260700," n.d.
- "JNJ000261010," n.d.
- "JNJ000265536," n.d.
- "JNJ000279507," n.d.
- "JNJ000348778," n.d.
- "JNJ000404860," n.d.
- "JNJ000460665," n.d.
- "JNJ000526750," n.d.
- John M. DeSesso. "Exponent Talc Defense Presentation Toxic Talc?" January 18, 2018.
- Jones, Richard E., and Kristin H. Lopez. "Human Reproductive Biology - 4th Edition Chapter 9 - Gamete Transport and Fertilization." In *Human Reproductive Biology*, Third., 159–73. San Diego: Academic Press, 2006. <https://doi.org/10.1016/B978-0-12-382184-3.00009-X>.
- Jordan, SJ, KL Cushing-Haugen, KG Wicklund, JA Doherty, and MA Rossing. "Breast Feeding and Risk of Epithelial Ovarian Cancer." *Cancer Causes & Control : CCC* 23, no. 6 (June 2012): 919–27. <https://doi.org/10.1007/s10552-012-9963-4>.
- Jordan, Susan J., Victor Siskind, Adèle C Green, David C. Whiteman, and Penelope M. Webb. "Breastfeeding and Risk of Epithelial Ovarian Cancer." *Cancer Causes & Control: CCC* 21, no. 1 (January 2010): 109–16. <https://doi.org/10.1007/s10552-009-9440-x>.
- Jordan, Susan J., David C. Whiteman, David M. Purdie, Adèle C. Green, and Penelope M. Webb. "Does Smoking Increase Risk of Ovarian Cancer? A Systematic Review." *Gynecologic Oncology* 103, no. 3 (December 2006): 1122–29. <https://doi.org/10.1016/j.ygyno.2006.08.012>.
- Jurinski, Joseph B., and J. Donald Rimstidt. "Biodurability of Talc." *American Mineralogist* 86, no. 4 (April 2001): 392–99. <https://doi.org/10.2138/am-2001-0402>.
- Kane, AB, P Boffetta, R Saracci, and JD Wilbourn. "Mechanisms of Fibre Carcinogenesis." IARC, 1996.
- Kang, N., D. Griffin, and H. Ellis. "The Pathological Effects of Glove and Condom Dusting Powders." *Journal of Applied Toxicology* 12, no. 6 (December 1992): 443–49.
<https://doi.org/10.1002/jat.2550120614>.

- Karageorgi, Stalo, Margaret A. Gates, Susan E. Hankinson, and Immaculata De Vivo. "Perineal Use of Talcum Powder and Endometrial Cancer Risk." *Cancer Epidemiology, Biomarkers & Prevention : A Publication of the American Association for Cancer Research, Cosponsored by the American Society of Preventive Oncology* 19, no. 5 (May 2010): 1269–75. <https://doi.org/10.1158/1055-9965.EPI-09-1221>.
- Kasper, C. S., and P. J. Chandler. "Possible Morbidity in Women from Talc on Condoms." *JAMA: The Journal of the American Medical Association* 273, no. 11 (March 15, 1995): 846–47.
- Kauff, Noah D., Nandita Mitra, Mark E. Robson, Karen E. Hurley, Shaokun Chuai, Deborah Goldfrank, Eve Wadsworth, et al. "Risk of Ovarian Cancer in BRCA1 and BRCA2 Mutation-Negative Hereditary Breast Cancer Families." *Journal of the National Cancer Institute* 97, no. 18 (September 21, 2005): 1382–84. <https://doi.org/10.1093/jnci/dji281>.
- Keskin, Nadi, Yasemin Aktan Teksen, Esra Gürlek Ongun, Yusuf Ozay, and Halil Saygili. "Does Long-Term Talc Exposure Have a Carcinogenic Effect on the Female Genital System of Rats? An Experimental Pilot Study." *Archives of Gynecology and Obstetrics* 280, no. 6 (December 2009): 925–31. <https://doi.org/10.1007/s00404-009-1030-3>.
- Khan, Mohd Imran, AmoghA. Sahasrabuddhe, Govil Patil, Mohd Javed Akhtar, Mohd Ashquin, and Iqbal Ahmad. "Nano-Talc Stabilizes TNF- α m-RNA in Human Macrophages." *Journal of Biomedical Nanotechnology* 7, no. 1 (January 1, 2011): 112–13. <https://doi.org/10.1166/jbn.2011.1227>.
- King, HM. "Talc: The Softest Mineral.," n.d. <https://geology.com/minerals/talc.shtml>.
- King, Talmadge. "Asbestos-Related Pleuropulmonary Disease." Edited by Kevin Flaherty. *UpToDate*, 2018.
- Kiraly, Orsolya, Guanyu Gong, Werner Olipitz, Sureshkumar Muthupalani, and Bevin P. Engelward. "Inflammation-Induced Cell Proliferation Potentiates DNA Damage-Induced Mutations In Vivo." *PLoS Genetics*, February 3, 2015. <https://doi.org/10.1371/journal.pgen.1004901>.
- Kissler, Stefan, Ernst Siebzehnuebl, Joachim Kohl, Anja Mueller, Nadja Hamscho, Regine Gaetje, Andre Ahr, Achim Rody, and Manfred Kaufmann. "Uterine Contractility and Directed Sperm Transport Assessed by Hysterosalpingoscintigraphy (HSSG) and Intrauterine Pressure (IUP) Measurement." *Acta Obstetricia Et Gynecologica Scandinavica* 83, no. 4 (April 2004): 369–74.
- Klampfer, Lidija. "Cytokines, Inflammation and Colon Cancer." *Current Cancer Drug Targets* 11, no. 4 (May 2011): 451–64.
- Knudson, A. G. "Mutation and Cancer: Statistical Study of Retinoblastoma." *Proceedings of the National Academy of Sciences of the United States of America* 68, no. 4 (April 1971): 820–23.
- Kunz, G., D. Beil, H. Deiniger, A. Einspanier, G. Mall, and G. Leyendecker. "The Uterine Peristaltic Pump. Normal and Impeded Sperm Transport within the Female Genital Tract." *Advances in Experimental Medicine and Biology* 424 (1997): 267–77.
- Kurman, Robert J., and Ie-Ming Shih. "Molecular Pathogenesis and Extraovarian Origin of Epithelial Ovarian Cancer. Shifting the Paradigm." *Human Pathology* 42, no. 7 (July 2011): 918–31. <https://doi.org/10.1016/j.humpath.2011.03.003>.
- . "The Dualistic Model of Ovarian Carcinogenesis." *The American Journal of Pathology* 186, no. 4 (April 1, 2016): 733–47. <https://doi.org/10.1016/j.ajpath.2015.11.011>.
- . "The Origin and Pathogenesis of Epithelial Ovarian Cancer: A Proposed Unifying Theory." *The American Journal of Surgical Pathology* 34, no. 3 (March 2010): 433–43. <https://doi.org/10.1097/PAS.0b013e3181cf3d79>.
- Kurta, Michelle L., Kirsten B. Moysich, Joel L. Weissfeld, Ada O. Youk, Clareann H. Bunker, Robert P. Edwards, Francesmary Modugno, Roberta B. Ness, and Brenda Diergaarde. "Use of Fertility

- Drugs and Risk of Ovarian Cancer: Results from a US-Based Case-Control Study.” *Cancer Epidemiology, Biomarkers & Prevention: A Publication of the American Association for Cancer Research, Cosponsored by the American Society of Preventive Oncology* 21, no. 8 (August 2012): 1282–92. <https://doi.org/10.1158/1055-9965.EPI-12-0426>.
- La Vecchia. “Ovarian Cancer: Epidemiology and Risk Factors.” *European Journal of Cancer Prevention* 26 (2017): 55–62.
- Lancaster, Johnathan M., C. Bethan Powell, Lee-may Chen, and Debra L. Richardson. “Society of Gynecologic Oncology Statement on Risk Assessment for Inherited Gynecologic Cancer Predispositions.” *Gynecologic Oncology* 136, no. 1 (January 2015): 3–7. <https://doi.org/10.1016/j.ygyno.2014.09.009>.
- Landen, Charles N., Michael J. Birrer, and Anil K. Sood. “Early Events in the Pathogenesis of Epithelial Ovarian Cancer.” *Journal of Clinical Oncology: Official Journal of the American Society of Clinical Oncology* 26, no. 6 (February 20, 2008): 995–1005. <https://doi.org/10.1200/JCO.2006.07.9970>.
- Langseth, H., S. E. Hankinson, J. Siemiatycki, and E. Weiderpass. “Perineal Use of Talc and Risk of Ovarian Cancer.” *Journal of Epidemiology and Community Health* 62, no. 4 (April 2008): 358–60. <https://doi.org/10.1136/jech.2006.047894>.
- Langseth, H., B.V. Johansen, J.M. Nesland, and K. Kjaerheim. “Asbestos Fibers in Ovarian Tissue from Norwegian Pulp and Paper Workers.” *International Journal of Gynecological Cancer* 17, no. 1 (January 2007): 44–49. <https://doi.org/10.1111/j.1525-1438.2006.00768.x>.
- Langseth, Hilde, and Kristina Kjaerheim. “Ovarian Cancer and Occupational Exposure among Pulp and Paper Employees in Norway.” *Scandinavian Journal of Work, Environment & Health* 30, no. 5 (October 2004): 356–61.
- Lanphear, B. P., and C. R. Buncher. “Latent Period for Malignant Mesothelioma of Occupational Origin.” *Journal of Occupational Medicine.: Official Publication of the Industrial Medical Association* 34, no. 7 (July 1992): 718–21.
- Lee, Jennifer S., Esther M. John, Valerie McGuire, Anna Felberg, Kimberly L. Ostrow, Richard A. DiCioccio, Frederick P. Li, Alexander Miron, Dee W. West, and Alice S. Whittemore. “Breast and Ovarian Cancer in Relatives of Cancer Patients, with and without BRCA Mutations.” *Cancer Epidemiology, Biomarkers & Prevention: A Publication of the American Association for Cancer Research, Cosponsored by the American Society of Preventive Oncology* 15, no. 2 (February 2006): 359–63. <https://doi.org/10.1158/1055-9965.EPI-05-0687>.
- Levanon, Keren, Christopher Crum, and Ronny Drapkin. “New Insights Into the Pathogenesis of Serous Ovarian Cancer and Its Clinical Impact.” *Journal of Clinical Oncology* 26, no. 32 (November 10, 2008): 5284–93. <https://doi.org/10.1200/JCO.2008.18.1107>.
- Levy-Lahad, E., and E. Friedman. “Cancer Risks among BRCA1 and BRCA2 Mutation Carriers.” *British Journal of Cancer* 96, no. 1 (January 15, 2007): 11–15. <https://doi.org/10.1038/sj.bjc.6603535>.
- Lin, Hui-Wen, Ying-Yueh Tu, Shiyng Yu Lin, Wei-Ju Su, Wei Li Lin, Wei Zer Lin, Shen-Chi Wu, and Yuen-Liang Lai. “Risk of Ovarian Cancer in Women with Pelvic Inflammatory Disease: A Population-Based Study.” *The Lancet. Oncology* 12, no. 9 (September 2011): 900–904. [https://doi.org/10.1016/S1470-2045\(11\)70165-6](https://doi.org/10.1016/S1470-2045(11)70165-6).
- Liou, Geou-Yarh, and Peter Storz. “Reactive Oxygen Species in Cancer.” *Free Radical Research* 44, no. 5 (May 2010): 476–96. <https://doi.org/10.3109/10715761003667554>.

- Liu, D. T., and A. Hitchcock. "Endometriosis: Its Association with Retrograde Menstruation, Dysmenorrhoea and Tubal Pathology." *British Journal of Obstetrics and Gynaecology* 93, no. 8 (August 1986): 859–62.
- Lo-Ciganic, Wei-Hsuan, Janice C. Zgibor, Clareann H. Bunker, Kirsten B. Moysich, Robert P. Edwards, and Roberta B. Ness. "Aspirin, Nonaspirin Nonsteroidal Anti-Inflammatory Drugs, or Acetaminophen and Risk of Ovarian Cancer." *Epidemiology (Cambridge, Mass.)* 23, no. 2 (March 2012): 311–19. <https://doi.org/10.1097/EDE.0b013e3182456ad3>.
- Lockey, J. E. "Nonasbestos Fibrous Minerals." *Clinics in Chest Medicine* 2, no. 2 (May 1981): 203–18.
- "Longo - Feb 2018 MAS Report," 2018.
- Longo, D. L., and R. C. Young. "Cosmetic Talc and Ovarian Cancer." *Lancet* 2, no. 8138 (August 18, 1979): 349–51.
- Longo, William E., and Mark W. Rigler. "Analysis of Johnson & Johnson Baby Powder & Valiant Shower to Shower Products for Amphibole (Tremolite) Asbestos," August 2, 2017.
- Longo, William E., and Rigler, Mark W. "MAS Project #14-1683, Analysis of William E. Longo, PhD and Mark W. Rigler, PhD," April 28, 2017.
- . "TEM Analysis of Historical 1978 Johnson's Baby Powder Sample for Amphibole Asbestos," February 16, 2018.
- Longo, William E., and Mark W. Rigler. "The Analysis of Johnson & Johnson's Historical Baby Powder & Shower to Shower Products from the 1960's to the Early 1990's for Amphibole Asbestos," November 14, 2018.
- Longo, William E., Mark W. Rigler, and William B. Egeland. "Below the Waist Application of Johnson & Johnson Baby Powder." Materials Analytical Service, LLC, September 2017.
- Luan, Nan-Nan, Qi-Jun Wu, Ting-Ting Gong, Emily Vogtmann, Yong-Lai Wang, and Bei Lin. "Breastfeeding and Ovarian Cancer Risk: A Meta-Analysis of Epidemiologic Studies1234." *The American Journal of Clinical Nutrition* 98, no. 4 (October 2013): 1020–31. <https://doi.org/10.3945/ajcn.113.062794>.
- Lundin, Eva, Laure Dossus, Tess Clendenen, Vittorio Krogh, Kjell Grankvist, Marianne Wulff, Sabina Sieri, et al. "C-Reactive Protein and Ovarian Cancer: A Prospective Study Nested in Three Cohorts (Sweden, USA, Italy)." *Cancer Causes & Control: CCC* 20, no. 7 (September 2009): 1151–59. <https://doi.org/10.1007/s10552-009-9330-2>.
- Madsen, Cecilie, Louise Baandrup, Christian Dehlendorff, and Susanne K. Kjaer. "Tubal Ligation and Salpingectomy and the Risk of Epithelial Ovarian Cancer and Borderline Ovarian Tumors: A Nationwide Case-Control Study." *Acta Obstetrica Et Gynecologica Scandinavica* 94, no. 1 (January 2015): 86–94. <https://doi.org/10.1111/aogs.12516>.
- Magnani, C., D. Ferrante, F. Barone-Adesi, M. Bertolotti, A. Todesco, D. Mirabelli, and B. Terracini. "Cancer Risk after Cessation of Asbestos Exposure: A Cohort Study of Italian Asbestos Cement Workers." *Occupational and Environmental Medicine* 65, no. 3 (March 2008): 164–70. <https://doi.org/10.1136/oem.2007.032847>.
- Mäki-Nevala, Satu, Virinder Kaur Sarhadi, Aija Knuuttila, Ilari Scheinin, Pekka Ellonen, Sonja Lagström, Mikko Rönty, et al. "Driver Gene and Novel Mutations in Asbestos-Exposed Lung Adenocarcinoma and Malignant Mesothelioma Detected by Exome Sequencing." *Lung* 194, no. 1 (February 2016): 125–35. <https://doi.org/10.1007/s00408-015-9814-7>.
- Mallen, Adrienne R., Mary K. Townsend, and Shelley S. Tworoger. "Risk Factors for Ovarian Carcinoma." *Hematology/Oncology Clinics of North America*, September 2018. <https://doi.org/10.1016/j.hoc.2018.07.002>.

- Mannino, David M. "Cigarette Smoking and Other Possible Risk Factors for Lung Cancer." *UpToDate*, 2018.
- McCullough, Marie. "Condom Makers Stop Using Talc." *Asbury Park Press*. January 16, 1996.
- . "Women's Health Concerns Prompt Condom Makers to Stop Using Talc." *Jersey Journal*. April 17, 1996, City Edition edition.
- McLaughlin-Drubin, Margaret E., and Karl Munger. "Viruses Associated with Human Cancer." *Biochimica et Biophysica Acta* 1782, no. 3 (March 2008): 127–50.
<https://doi.org/10.1016/j.bbadis.2007.12.005>.
- McLemore, Miaskowski, Chen Aouizerat, and Dodd. "Epidemiological and Genetic Factors Associated With Ovarian Cancer." *Cancer Nursing* 32, no. 4 (2009): 281–88.
- Melaiu, Ombretta, Federica Gemignani, and Stefano Landi. "The Genetic Susceptibility in the Development of Malignant Pleural Mesothelioma." *Journal of Thoracic Disease* 10, no. Suppl 2 (January 2018): S246–52. <https://doi.org/10.21037/jtd.2017.10.41>.
- Meng, Qingsong, Weixue Sun, John Jiang, Nicole M. Fletcher, Michael P. Diamond, and Ghassan M. Saed. "Identification of Common Mechanisms between Endometriosis and Ovarian Cancer." *Journal of Assisted Reproduction and Genetics* 28 (2011): 917–23.
- Merritt, Melissa A., Adèle C. Green, Christina M. Nagle, Penelope M. Webb, Australian Cancer Study (Ovarian Cancer), and Australian Ovarian Cancer Study Group. "Talcum Powder, Chronic Pelvic Inflammation and NSAIDs in Relation to Risk of Epithelial Ovarian Cancer." *International Journal of Cancer. Journal International Du Cancer* 122, no. 1 (January 1, 2008): 170–76. <https://doi.org/10.1002/ijc.23017>.
- Miller, Diane M., and Jessica N. McAlpine. "Opportunistic Salpingectomy for Ovarian, Fallopian Tubal, and Peritoneal Carcinoma Risk Reduction." *UpToDate*, 2018.
- Mills, Paul K., Deborah G. Riordan, Rosemary D. Cress, and Heather A. Young. "Perineal Talc Exposure and Epithelial Ovarian Cancer Risk in the Central Valley of California." *International Journal of Cancer. Journal International Du Cancer* 112, no. 3 (November 10, 2004): 458–64.
<https://doi.org/10.1002/ijc.20434>.
- Milne, R. L., and A. C. Antoniou. "Genetic Modifiers of Cancer Risk for BRCA1 and BRCA2 Mutation Carriers." *Annals of Oncology: Official Journal of the European Society for Medical Oncology* 22 Suppl 1 (January 2011): i11–17. <https://doi.org/10.1093/annonc/mdq660>.
- Milne, Roger L., and Antonis C. Antoniou. "Modifiers of Breast and Ovarian Cancer Risks for BRCA1 and BRCA2 Mutation Carriers." *Endocrine-Related Cancer* 23, no. 10 (2016): T69–84.
<https://doi.org/10.1530/ERC-16-0277>.
- Moller, Danielsen, and Roursgaard Jantzen. "Oxidatively Damaged DNA in Animals Exposed to Particles." *Critical Reviews in Toxicology* 43, no. 2 (2013): 96–118.
- Moon, Min Chaul, Jung Duck Park, Byung Soon Choi, So Young Park, Dong Won Kim, Yong Hyun Chung, Naomi Hisanaga, and Il Je Yu. "Risk Assessment of Baby Powder Exposure through Inhalation." *Toxicological Research* 27, no. 3 (September 2011): 137–41.
<https://doi.org/10.5487/TR.2011.27.3.137>.
- Moorman, Patricia G. "Scientific Review of the Epidemiologic Evidence on Talc Use and Ovarian Cancer," February 2018.
- Moorman, Patricia G., Rachel T. Palmieri, Lucy Akushevich, Andrew Berchuck, and Joellen M. Schildkraut. "Ovarian Cancer Risk Factors in African-American and White Women." *American Journal of Epidemiology* 170, no. 5 (September 1, 2009): 598–606.
<https://doi.org/10.1093/aje/kwp176>.

- Mostafa, S. A., C. B. Barger, R. W. Flower, N. B. Rosenshein, T. H. Parmley, and J. D. Woodruff. "Foreign Body Granulomas in Normal Ovaries." *Obstetrics and Gynecology* 66, no. 5 (November 1985): 701–2.
- Murphy, Megan A., Britton Trabert, Hannah P. Yang, Yikyung Park, Louise A. Brinton, Patricia Hartge, Mark E. Sherman, Albert Hollenbeck, and Nicolas Wentzensen. "Non-Steroidal Anti-Inflammatory Drug Use and Ovarian Cancer Risk: Findings from the NIH-AARP Diet and Health Study and Systematic Review." *Cancer Causes & Control : CCC* 23, no. 11 (November 2012): 1839–52. <https://doi.org/10.1007/s10552-012-0063-2>.
- Muscat, J. E., and M. S. Huncharek. "Causation and Disease: Biomedical Science in Toxic Tort Litigation." *Journal of Occupational Medicine.: Official Publication of the Industrial Medical Association* 31, no. 12 (December 1989): 997–1002.
- Nadler, Diana L., and Igor G. Zurbenko. "Estimating Cancer Latency Times Using a Weibull Model," 2014, 8.
- Narod, Steven A. "Talc and Ovarian Cancer." *Gynecologic Oncology* 141, no. 3 (2016): 410–12. <https://doi.org/10.1016/j.ygyno.2016.04.011>.
- National Cancer Institute, Surveillance, Epidemiology, and End Results Program. "Cancer Stat Facts: Ovarian Cancer," 2018. <https://seer.cancer.gov/statfacts/html/ovary.html>.
- "National Toxicology Program (NTP) Technical Report (NTP TR 421) on the Toxicology and Carcinogenesis Studies of Talc in F344/N Rats and B6C3F1 Mice." National Institutes of Health, 1993.
- Nelson, Heather H., and Karl T. Kelsey. "The Molecular Epidemiology of Asbestos and Tobacco in Lung Cancer." *Oncogene* 21, no. 48 (October 21, 2002): 7284–88. <https://doi.org/10.1038/sj.onc.1205804>.
- Ness, R. B., and C. Cottreau. "Possible Role of Ovarian Epithelial Inflammation in Ovarian Cancer." *JNCI Journal of the National Cancer Institute* 91, no. 17 (September 1, 1999): 1459–67. <https://doi.org/10.1093/jnci/91.17.1459>.
- Ness, R. B., J. A. Grisso, C. Cottreau, J. Klapper, R. Vergona, J. E. Wheeler, M. Morgan, and J. J. Schlesselman. "Factors Related to Inflammation of the Ovarian Epithelium and Risk of Ovarian Cancer." *Epidemiology (Cambridge, Mass.)* 11, no. 2 (March 2000): 111–17.
- Ness, Roberta B., Daniel W. Cramer, Marc T. Goodman, Susanne Krüger Kjaer, Kathy Mallin, Berit Jul Mosgaard, David M. Purdie, Harvey A. Risch, Ronald Vergona, and Anna H. Wu. "Infertility, Fertility Drugs, and Ovarian Cancer: A Pooled Analysis of Case-Control Studies." *American Journal of Epidemiology* 155, no. 3 (February 1, 2002): 217–24.
- Neutra, Raymond Richard, Carl F. Cranor, and David Gee. "The Use and Misuse of Bradford Hill in U.S. Tort Law." *Jurimetrics J.*, 2018, 127–62.
- Newhouse, M. L., G. Berry, J. C. Wagner, and M. E. Turok. "A Study of the Mortality of Female Asbestos Workers." *British Journal of Industrial Medicine* 29, no. 2 (April 1972): 134–41.
- Nick, Alpa M., Robert L. Coleman, Pedro T. Ramirez, and Anil K. Sood. "A Framework for a Personalized Surgical Approach to Ovarian Cancer." *Nature Reviews. Clinical Oncology* 12, no. 4 (April 2015): 239–45. <https://doi.org/10.1038/nrclinonc.2015.26>.
- NIOSH. "Asbestos Fibers and Other Elongated Mineral Particles: State of the Science and Roadmap for Research (Revised Draft)," January 2009.
- . "Fiber Exposure during Use of Baby Powders, Report No. IWS-36-6.," July 1972. <https://www.cdc.gov/niosh/nioshtic-2/00106056.html>.
- "NIOSH 2011 Current Intelligence Bulletin No. 62," 2011.

- “NIOSH-TIC-2 Publications Search - 00106056 - Fiber Exposure during Use of Baby Powders, Report No. IWS-36-6.” Accessed August 16, 2018. <https://www.cdc.gov/niosh/nioshtic-2/00106056.html>.
- “NIOSH-TIC-2 Publications Search - 00106056 - Fiber .Pdf,” n.d.
- Norquist, Barbara M., Maria I. Harrell, Mark F. Brady, Tom Walsh, Ming K. Lee, Suleyman Gulsuner, Sarah S. Bernards, et al. “Inherited Mutations in Women With Ovarian Carcinoma.” *JAMA Oncology* 2, no. 4 (April 2016): 482–90. <https://doi.org/10.1001/jamaoncol.2015.5495>.
- NTP. “NTP Technical Report on the Toxicology and Carcinogenesis Studies of Benzophenone (CAS No. 119-61-9) In F344/N Rats and B6C3F1 Mice,” February 2006.
- “NTP Toxicology and Carcinogenesis Studies of Talc (CAS No. 14807-96-6)(NonAsbestiform) in F344/N.Rats and B6C3F1 Mice (Inhalation Studies),” 1993.
- Oberdörster, Günter, Eva Oberdörster, and Jan Oberdörster. “Nanotoxicology: An Emerging Discipline Evolving from Studies of Ultrafine Particles.” *Environmental Health Perspectives* 113, no. 7 (July 2005): 823–39. <https://doi.org/10.1289/ehp.7339>.
- Okada, Futoshi. “Beyond Foreign-Body-Induced Carcinogenesis: Impact of Reactive Oxygen Species Derived from Inflammatory Cells in Tumorigenic Conversion and Tumor Progression.” *International Journal of Cancer* 121, no. 11 (December 1, 2007): 2364–72. <https://doi.org/10.1002/ijc.23125>.
- Paoletti, L., S. Caiazza, G. Donelli, and F. Pocchiari. “Evaluation by Electron Microscopy Techniques of Asbestos Contamination in Industrial, Cosmetic, and Pharmaceutical Talcs.” *Regulatory Toxicology and Pharmacology: RTP* 4, no. 3 (September 1984): 222–35.
- Park, Hyo K., Joellen M. Schildkraut, Anthony J. Alberg, Elisa V. Bandera, Jill S. Barnholtz-Sloan, Melissa Bondy, Sydnee Crankshaw, et al. “Benign Gynecologic Conditions Are Associated with Ovarian Cancer Risk in African-American Women: A Case–Control Study.” *Cancer Causes & Control*, September 29, 2018. <https://doi.org/10.1007/s10552-018-1082-4>.
- Parmar, M. K. B., J. A. Ledermann, N. Colombo, A. du Bois, J.-F. Delaloye, G. B. Kristensen, S. Wheeler, et al. “Paclitaxel plus Platinum-Based Chemotherapy versus Conventional Platinum-Based Chemotherapy in Women with Relapsed Ovarian Cancer: The ICON4/AGO-OVAR-2.2 Trial.” *Lancet (London, England)* 361, no. 9375 (June 21, 2003): 2099–2106.
- Parmley, T. H., and J. D. Woodruff. “The Ovarian Mesothelioma.” *American Journal of Obstetrics and Gynecology* 120, no. 2 (September 15, 1974): 234–41.
- Pathology of Asbestos-Associated Diseases*, 2011.
<http://www.springer.com/medicine/pathology/book/978-1-4419-1894-9>.
- “PCPC_MDL00062175,” May 25, 1999.
- Pearce, Celeste Leigh, Claire Templeman, Mary Anne Rossing, Alice Lee, Aimee M Near, Penelope M Webb, Christina M Nagle, et al. “Association between Endometriosis and Risk of Histological Subtypes of Ovarian Cancer: A Pooled Analysis of Case–Control Studies.” *The Lancet Oncology* 13, no. 4 (April 2012): 385–94. [https://doi.org/10.1016/S1470-2045\(11\)70404-1](https://doi.org/10.1016/S1470-2045(11)70404-1).
- Pejovic, Tanja, and Farr Nezhat. “Missing Link: Inflammation and Ovarian Cancer.” *The Lancet. Oncology* 12, no. 9 (September 2011): 833–34. [https://doi.org/10.1016/S1470-2045\(11\)70203-0](https://doi.org/10.1016/S1470-2045(11)70203-0).
- Pelling, D., and J. G. Evans. “Long-Term Peritoneal Tissue Response in Rats to Mould-Release Agents and Lubricant Powder Used on Surgeons’ Gloves.” *Food and Chemical Toxicology: An International Journal Published for the British Industrial Biological Research Association* 24, no. 5 (May 1986): 425–30.

- Penninkilampi, Ross, and Guy D. Eslick. "Perineal Talc Use and Ovarian Cancer: A Systematic Review and Meta-Analysis." *Epidemiology (Cambridge, Mass.)* 29, no. 1 (January 2018): 41–49. <https://doi.org/10.1097/EDE.0000000000000745>.
- Peshkin, B., and et al. "Genetic Counseling and Testing for Hereditary Breast and Ovarian Cancer - UpToDate," 2018. https://www.uptodate.com/contents/genetic-counseling-and-testing-for-hereditary-breast-and-ovarian-cancer?search=Genetic%20counseling%20and%20testing%20for%20hereditary%20breast%20and%20ovarian%20cancer&source=search_result&selectedTitle=1~150&usage_type=default&display_rank=1.
- . "Overview of Hereditary Breast and Ovarian Cancer Syndromes - UpToDate," 2018. https://www.uptodate.com/contents/overview-of-hereditary-breast-and-ovarian-cancer-syndromes?search=Overview%20of%20hereditary%20breast%20and%20ovarian%20cancer%20syndromes&source=search_result&selectedTitle=1~150&usage_type=default&display_rank=1.
- . "Prevalence of BRCA1 and BRCA2 Mutations and Associated Cancer Risks - UpToDate," 2018. https://www.uptodate.com/contents/prevalence-of-brca1-and-brca2-mutations-and-associated-cancer-risks?search=prevalence-of-brca1-and-brca2-mu%E2%80%A6search_result%26selectedTitle%3D1~73%26usage_type%3Ddefault%26display_rank%3D1&source=search_result&selectedTitle=2~150&usage_type=default&display_rank=2.
- Phillips, J. C., P. J. Young, K. Hardy, and S. D. Gangolli. "Studies on the Absorption and Disposition of 3H-Labelled Talc in the Rat, Mouse, Guinea-Pig and Rabbit." *Food and Cosmetics Toxicology* 16, no. 2 (April 1978): 161–63.
- Pira, E, C Pelucchi, L Buffoni, A Palmas, M Turbiglio, E Negri, P G Piolatto, and C La Vecchia. "Cancer Mortality in a Cohort of Asbestos Textile Workers." *British Journal of Cancer* 92, no. 3 (February 2005): 580–86. <https://doi.org/10.1038/sj.bjc.6602240>.
- Pira, Enrico, Canzio Romano, Francesco S. Violante, Andrea Farioli, Giovanna Spatari, Carlo La Vecchia, and Paolo Boffetta. "Updated Mortality Study of a Cohort of Asbestos Textile Workers." *Cancer Medicine* 5, no. 9 (2016): 2623–28. <https://doi.org/10.1002/cam4.824>.
- "Pltf_MISC_00000272 (JANSSEN-000001-19)," 1962.
- Porro, F. W., and N. M. Levine. "Pathology of Talc Pneumoconiosis with Report of an Autopsy." *Northern New York Medical Journal* 3 (April 1946): 23–25.
- Pott, R., and K. H. Friedrichs. "Tumors in Rats Following i.p. Injection of Fiberform Dusts." *Naturwissenschaften* 59 (n.d.): 318–24.
- Prat, Jaime, and FIGO Committee on Gynecologic Oncology. "Abridged Republication of FIGO's Staging Classification for Cancer of the Ovary, Fallopian Tube, and Peritoneum." *Cancer* 121, no. 19 (October 1, 2015): 3452–54. <https://doi.org/10.1002/cncr.29524>.
- Pukkala, Eero, Jan Ivar Martinsen, Elsebeth Lynge, Holmfridur Kolbrun Gunnarsdottir, Pär Sparén, Laufey Tryggvadottir, Elisabete Weiderpass, and Kristina Kjaerheim. "Occupation and Cancer - Follow-up of 15 Million People in Five Nordic Countries." *Acta Oncologica (Stockholm, Sweden)* 48, no. 5 (2009): 646–790. <https://doi.org/10.1080/02841860902913546>.
- Purdie, D., A. Green, C. Bain, V. Siskind, B. Ward, N. Hacker, M. Quinn, G. Wright, P. Russell, and B. Susil. "Reproductive and Other Factors and Risk of Epithelial Ovarian Cancer: An Australian Case-Control Study. Survey of Women's Health Study Group." *International Journal of Cancer. Journal International Du Cancer* 62, no. 6 (September 15, 1995): 678–84.

- Purdie, David M., Christopher J. Bain, Victor Siskind, Penelope M. Webb, and Adèle C. Green. "Ovulation and Risk of Epithelial Ovarian Cancer." *International Journal of Cancer. Journal International Du Cancer* 104, no. 2 (March 20, 2003): 228–32. <https://doi.org/10.1002/ijc.10927>.
- Radic, I, I Vucak, J Milosevic, A Marusic, S Vukicevic, and M Marusic. "Immunosuppression Induced by Talc Granulomatosis in the Rat." *Clinical and Experimental Immunology* 73, no. 2 (August 1988): 316–21.
- Ramus, Susan J., Antonis C. Antoniou, Karoline B. Kuchenbaecker, Penny Soucy, Jonathan Beesley, Xiaoqing Chen, Lesley McGuffog, et al. "Ovarian Cancer Susceptibility Alleles and Risk of Ovarian Cancer in BRCA1 and BRCA2 Mutation Carriers." *Human Mutation* 33, no. 4 (April 2012): 690–702. <https://doi.org/10.1002/humu.22025>.
- Rasool, Nabila, Amanda Nickles Fader, Leigh Seamon, Nikki L. Neubauer, Fadi Abu Shahin, Heather A. Alexander, Kathleen Moore, et al. "Stage I, Grade 3 Endometrioid Adenocarcinoma of the Endometrium: An Analysis of Clinical Outcomes and Patterns of Recurrence." *Gynecologic Oncology* 116, no. 1 (January 2010): 10–14. <https://doi.org/10.1016/j.ygyno.2009.10.043>.
- Rayburn, Elizabeth R., Scharri J. Ezell, and Ruiwen Zhang. "Anti-Inflammatory Agents for Cancer Therapy." *Molecular and Cellular Pharmacology* 1, no. 1 (2009): 29–43. <https://doi.org/10.4255/mcpharmacol.09.05>.
- Rebbeck, Timothy R., Nandita Mitra, Fei Wan, Olga M. Sinilnikova, Sue Healey, Lesley McGuffog, Sylvie Mazoyer, et al. "Association of Type and Location of BRCA1 and BRCA2 Mutations with Risk of Breast and Ovarian Cancer." *JAMA* 313, no. 13 (April 7, 2015): 1347–61. <https://doi.org/10.1001/jama.2014.5985>.
- "Reference Manual on Scientific Evidence" Third Edition (2011).
- Reid, A., J. Heyworth, N. de Klerk, and A. W. Musk. "The Mortality of Women Exposed Environmentally and Domestically to Blue Asbestos at Wittenoom, Western Australia." *Occupational and Environmental Medicine* 65, no. 11 (November 2008): 743–49. <https://doi.org/10.1136/oem.2007.035782>.
- Reid, A., N. de Klerk, and A. W. Musk. "Does Exposure to Asbestos Cause Ovarian Cancer? A Systematic Literature Review and Meta-Analysis." *Cancer Epidemiology Biomarkers & Prevention* 20, no. 7 (July 1, 2011): 1287–95. <https://doi.org/10.1158/1055-9965.EPI-10-1302>.
- Reid, A., N. H. de Klerk, C. Magnani, D. Ferrante, G. Berry, A. W. Musk, and E. Merler. "Mesothelioma Risk after 40 Years since First Exposure to Asbestos: A Pooled Analysis." *Thorax* 69, no. 9 (September 2014): 843–50. <https://doi.org/10.1136/thoraxjnl-2013-204161>.
- Reid, Alison, Amanda Segal, Jane S. Heyworth, Nicholas H. de Klerk, and Arthur W. Musk. "Gynecologic and Breast Cancers in Women after Exposure to Blue Asbestos at Wittenoom." *Cancer Epidemiology, Biomarkers & Prevention: A Publication of the American Association for Cancer Research, Cosponsored by the American Society of Preventive Oncology* 18, no. 1 (January 2009): 140–47. <https://doi.org/10.1158/1055-9965.EPI-08-0746>.
- Reid, Brett M., Jennifer B. Permuth, and Thomas A. Sellers. "Epidemiology of Ovarian Cancer: A Review." *Cancer Biology & Medicine* 14, no. 1 (February 2017): 9–32. <https://doi.org/10.20892/j.issn.2095-3941.2016.0084>.
- Reuter, Simone, Subash C. Gupta, Madan M. Chaturvedi, and Bharat B. Aggarwal. "Oxidative Stress, Inflammation, and Cancer: How Are They Linked?" *Free Radical Biology and Medicine* 49, no. 11 (December 1, 2010): 1603–16.
- Rice, Megan S., Susan E. Hankinson, and Shelley S. Tworoger. "Tubal Ligation, Hysterectomy, Unilateral Oophorectomy, and Risk of Ovarian Cancer in the Nurses' Health Studies." *Fertility and Sterility* 102, no. 1 (July 2014): 192–198.e3. <https://doi.org/10.1016/j.fertnstert.2014.03.041>.

- Ring, Kari L., Christine Garcia, Martha H. Thomas, and Susan C. Modesitt. "Current and Future Role of Genetic Screening in Gynecologic Malignancies." *American Journal of Obstetrics and Gynecology* 217, no. 5 (2017): 512–21. <https://doi.org/10.1016/j.ajog.2017.04.011>.
- Riska, A., J. I. Martinsen, K. Kjaerheim, E. Lynge, P. Sparen, L. Tryggvadottir, E. Weiderpass, and E. Pukkala. "Occupation and Risk of Primary Fallopian Tube Carcinoma in Nordic Countries." *International Journal of Cancer* 131, no. 1 (July 1, 2012): 186–92. <https://doi.org/10.1002/ijc.26337>.
- Roggli, Victor L., Robin T. Vollmer, Kelly J. Butnor, and Thomas A. Sporn. "Tremolite and Mesothelioma." *Annals of Occupational Hygiene* 46, no. 5 (July 1, 2002): 447–53. <https://doi.org/10.1093/annhyg/mef056>.
- Rohl, A. N. "Asbestos in Talc." *Environmental Health Perspectives* 9 (December 1974): 129–32.
- Rohl, A. N., A. M. Langer, I. J. Selikoff, A. Tordini, R. Klimentidis, D. R. Bowes, and D. L. Skinner. "Consumer Talcums and Powders: Mineral and Chemical Characterization." *Journal of Toxicology and Environmental Health* 2, no. 2 (November 1976): 255–84. <https://doi.org/10.1080/15287397609529432>.
- Roodhouse Gloyne, S. "Two Cases of Squamous Carcinoma of the Lung Occurring in Asbestosis." *Tubercle* 17, no. 1 (October 1935): 5-IN2. [https://doi.org/10.1016/S0041-3879\(35\)80795-2](https://doi.org/10.1016/S0041-3879(35)80795-2).
- Rosalind A. Eeles, Christine D. Berg, and Jeffery S. Tobias. *Cancer Prevention and Screening: Concepts, Principles and Controversies*. 1st ed. Accessed August 21, 2018. <https://www.wiley.com/en-us/Cancer+Prevention+and+Screening%3A+Concepts%2C+Principles+and+Controversies-p-9781118990872>.
- Rosenblatt, K. A., M. Szklo, and N. B. Rosenshein. "Mineral Fiber Exposure and the Development of Ovarian Cancer." *Gynecologic Oncology* 45, no. 1 (April 1992): 20–25.
- Rosenblatt, Karin A., Noel S. Weiss, Kara L. Cushing-Haugen, Kristine G. Wicklund, and Mary Anne Rossing. "Genital Powder Exposure and the Risk of Epithelial Ovarian Cancer." *Cancer Causes & Control: CCC* 22, no. 5 (May 2011): 737–42. <https://doi.org/10.1007/s10552-011-9746-3>.
- Rösler, J. A., H. J. Weitowitz, H. J. Lange, R. H. Weitowitz, K. Ulm, and K. Rödelasperger. "Mortality Rates in a Female Cohort Following Asbestos Exposure in Germany." *Journal of Occupational Medicine.: Official Publication of the Industrial Medical Association* 36, no. 8 (August 1994): 889–93.
- Ross, M. "Geology, Asbestos, and Health." *Environmental Health Perspectives* 9 (December 1974): 123–24.
- Rothman, Kenneth J., Sander Greenland, and Timothy L. Lash. *Modern Epidemiology*. Lippincott Williams & Wilkins, 2008.
- Saed, Ghassan M., Rouba Ali-Fehmi, Zhong L. Jiang, Nicole M. Fletcher, Michael P. Diamond, Husam M. Abu-Soud, and Adnan R. Munkarah. "Myeloperoxidase Serves as a Redox Switch That Regulates Apoptosis in Epithelial Ovarian Cancer." *Gynecologic Oncology* 116, no. 2 (February 2010): 276–81. <https://doi.org/10.1016/j.ygyno.2009.11.004>.
- Saed, Ghassan M., Michael P. Diamond, and Nicole M. Fletcher. "Updates of the Role of Oxidative Stress in the Pathogenesis of Ovarian Cancer." *Gynecologic Oncology* 145, no. 3 (June 2017): 595–602. <https://doi.org/10.1016/j.ygyno.2017.02.033>.
- Saed, Ghassan M., Nicole M. Fletcher, Michael P. Diamond, Robert T. Morris, Nardhy Gomez-Lopez, and Ira Memaj. "Novel Expression of CD11b in Epithelial Ovarian Cancer: Potential Therapeutic Target." *Gynecologic Oncology* 148, no. 3 (2018): 567–75. <https://doi.org/10.1016/j.ygyno.2017.12.018>.

- Saed, Ghassan M., Robert T. Morris, and Nicole M. Fletcher. *New Insights into the Pathogenesis of Ovarian Cancer: Oxidative Stress*, 2018.
- Schenken, Robert S. "Endometriosis: Pathogenesis, Clinical Features, and Diagnosis." *UpToDate*, 2018.
- Schildkraut, Joellen M., Sarah E. Abbott, Anthony J. Alberg, Elisa V. Bandera, Jill S. Barnholtz-Sloan, Melissa L. Bondy, Michele L. Cote, et al. "Association between Body Powder Use and Ovarian Cancer: The African American Cancer Epidemiology Study (AACES)." *Cancer Epidemiology, Biomarkers & Prevention: A Publication of the American Association for Cancer Research, Cosponsored by the American Society of Preventive Oncology* 25, no. 10 (2016): 1411–17. <https://doi.org/10.1158/1055-9965.EPI-15-1281>.
- "SEER Cancer Statistics Review, 1975-2015, National Cancer Institute, Bethesda, MD, Based on November 2017 SEER Data Submission, Posted to the SEER Web Site," April 2018. https://Seer.cancer.gov/csr/1975_2015/.
- Shan, Weiwei, and Jinsong Liu. "Inflammation: A Hidden Path to Breaking the Spell of Ovarian Cancer." *Cell Cycle* 8, no. 19 (2009): 3107–11. <https://doi.org/10.4161/cc.8.19.9590>.
- Shukla, Arti, Maximilian B. MacPherson, Jedd Hillegass, Maria E. Ramos-Nino, Vlada Alexeeva, Pamela M. Vacek, Jeffrey P. Bond, Harvey I. Pass, Chad Steele, and Brooke T. Mossman. "Alterations in Gene Expression in Human Mesothelial Cells Correlate with Mineral Pathogenicity." *American Journal of Respiratory Cell and Molecular Biology* 41, no. 1 (July 2009): 114–23. <https://doi.org/10.1165/rcmb.2008-0146OC>.
- Shushan, A., O. Paltiel, J. Iscovich, U. Elchalal, T. Peretz, and J. G. Schenker. "Human Menopausal Gonadotropin and the Risk of Epithelial Ovarian Cancer." *Fertility and Sterility* 65, no. 1 (January 1996): 13–18.
- Singh, Naveena, C. Blake Gilks, Lynn Hirschowitz, Sean Kehoe, Iain A. McNeish, Dianne Miller, Raj Naik, Nafisa Wilkinson, and W. Glenn McCluggage. "Primary Site Assignment in Tubo-Ovarian High-Grade Serous Carcinoma: Consensus Statement on Unifying Practice Worldwide." *Gynecologic Oncology* 141, no. 2 (2016): 195–98. <https://doi.org/10.1016/j.ygyno.2015.10.022>.
- Sjösten, A. C. E., H. Ellis, and G. a. B. Edlstrom. "Retrograde Migration of Glove Powder in the Human Female Genital Tract." *Human Reproduction* 19, no. 4 (April 1, 2004): 991–95. <https://doi.org/10.1093/humrep/deh156>.
- Soini, Tuuli, Ritva Hurskainen, Seija Grénman, Johanna Mäenpää, Jorma Paavonen, and Eero Pukkala. "Cancer Risk in Women Using the Levonorgestrel-Releasing Intrauterine System in Finland." *Obstetrics and Gynecology* 124, no. 2 Pt 1 (August 2014): 292–99. <https://doi.org/10.1097/AOG.0000000000000356>.
- Soong, Thing Rinda, Brooke E. Howitt, Alexander Miron, Neil S. Horowitz, Frank Campbell, Colleen M. Feltmate, Michael G. Muto, et al. "Evidence for Lineage Continuity between Early Serous Proliferations (ESPs) in the Fallopian Tube and Disseminated High-Grade Serous Carcinomas." *The Journal of Pathology*, July 25, 2018. <https://doi.org/10.1002/path.5145>.
- Stanton, M. F., M. Layard, A. Tegeris, E. Miller, M. May, E. Morgan, and A. Smith. "Relation of Particle Dimension to Carcinogenicity in Amphibole Asbestos and Other Fibrous Minerals." *Journal of the National Cancer Institute* 67, no. 5 (November 1981): 965–75.
- Starman, Daniel H., Leslie A. Litzky, and Larry R. Kaiser. "Epidemiology of Malignant Pleural Mesothelioma." *UpToDate*, 2018.
- Steiling, W., J. F. Almeida, H. Assaf Vandecasteele, S. Gilpin, T. Kawamoto, L. O'Keeffe, G. Pappa, K. Rettinger, H. Rothe, and A. M. Bowden. "Principles for the Safety Evaluation of Cosmetic Powders." *Toxicology Letters*, August 17, 2018. <https://doi.org/10.1016/j.toxlet.2018.08.011>.

- Steiling, W., M. Bascompta, P. Carthew, G. Catalano, N. Corea, A. D'Haese, P. Jackson, et al. "Principle Considerations for the Risk Assessment of Sprayed Consumer Products." *Toxicology Letters* 227, no. 1 (May 16, 2014): 41–49. <https://doi.org/10.1016/j.toxlet.2014.03.005>.
- Stewart, Louise M., C. D'Arcy J. Holman, Patrick Aboagye-Sarfo, Judith C. Finn, David B. Preen, and Roger Hart. "In Vitro Fertilization, Endometriosis, Nulliparity and Ovarian Cancer Risk." *Gynecologic Oncology* 128, no. 2 (February 2013): 260–64. <https://doi.org/10.1016/j.ygyno.2012.10.023>.
- Stewart, Louise M., Katrina Spilsbury, Susan Jordan, Colin Stewart, C. D'Arcy J. Holman, Aime Powell, Joanne Reekie, and Paul Cohen. "Risk of High-Grade Serous Ovarian Cancer Associated with Pelvic Inflammatory Disease, Parity and Breast Cancer." *Cancer Epidemiology* 55 (August 2018): 110–16. <https://doi.org/10.1016/j.canep.2018.05.011>.
- Straif, Kurt. "Update of the Scientific Evidence on Asbestos and Cancer." presented at the International Conference on Environmental and Occupational Determinants of Cancer: Interventions for Primary Prevention, Asturias (Avilés, Gijón), Spain, March 17, 2011.
- "Talc." *IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans* 42 (1987): 185–224.
- Tarchi, M., D. Orsi, P. Comba, M. De Santis, R. Pirastu, G. Battista, and M. Valiani. "Cohort Mortality Study of Rock Salt Workers in Italy." *American Journal of Industrial Medicine* 25, no. 2 (February 1994): 251–56.
- Terry, Kathryn L., Stalo Karageorgi, Yurii B. Shvetsov, Melissa A. Merritt, Galina Lurie, Pamela J. Thompson, Michael E. Carney, et al. "Genital Powder Use and Risk of Ovarian Cancer: A Pooled Analysis of 8,525 Cases and 9,859 Controls." *Cancer Prevention Research (Philadelphia, Pa.)* 6, no. 8 (August 2013): 811–21. <https://doi.org/10.1158/1940-6207.CAPR-13-0037>.
- Tewari, Devansu, James J. Java, Ritu Salani, Deborah K. Armstrong, Maurie Markman, Thomas Herzog, Bradley J. Monk, and John K. Chan. "Long-Term Survival Advantage and Prognostic Factors Associated with Intraperitoneal Chemotherapy Treatment in Advanced Ovarian Cancer: A Gynecologic Oncology Group Study." *Journal of Clinical Oncology: Official Journal of the American Society of Clinical Oncology* 33, no. 13 (May 1, 2015): 1460–66. <https://doi.org/10.1200/JCO.2014.55.9898>.
- Thai, T. H., F. Du, J. T. Tsan, Y. Jin, A. Phung, M. A. Spillman, H. F. Massa, et al. "Mutations in the BRCA1-Associated RING Domain (BARD1) Gene in Primary Breast, Ovarian and Uterine Cancers." *Human Molecular Genetics* 7, no. 2 (February 1998): 195–202.
- Thomas, Charles A., and Major G. Seelig. Powder lubricated surgeon's rubber glove. United States US2621333A, filed June 27, 1947, and issued December 16, 1952. <https://patents.google.com/patent/US2621333/en>.
- Torre, Lindsey A., Britton Trabert, Carol E. DeSantis, Kimberly D. Miller, Goli Samimi, Carolyn D. Runowicz, Mia M. Gaudet, Ahmedin Jemal, and Rebecca L. Siegel. "Ovarian Cancer Statistics, 2018." *CA: A Cancer Journal for Clinicians* 68, no. 4 (July 2018): 284–96. <https://doi.org/10.3322/caac.21456>.
- Trabert, Britton. "Body Powder and Ovarian Cancer Risk – What Is the Role of Recall Bias?" *Cancer Epidemiology, Biomarkers & Prevention: A Publication of the American Association for Cancer Research, Cosponsored by the American Society of Preventive Oncology* 25, no. 10 (October 2016): 1369–70. <https://doi.org/10.1158/1055-9965.EPI-16-0476>.
- Trabert, Britton, Ligia Pinto, Patricia Hartge, Troy Kemp, Amanda Black, Mark E. Sherman, Louise A. Brinton, et al. "Pre-Diagnostic Serum Levels of Inflammation Markers and Risk of Ovarian

- Cancer in the Prostate, Lung, Colorectal and Ovarian Cancer (PLCO) Screening Trial.” *Gynecologic Oncology* 135, no. 2 (November 2014): 297–304.
<https://doi.org/10.1016/j.ygyno.2014.08.025>.
- Trabert, Britton, Elizabeth M Poole, Emily White, Kala Visvanathan, Hans-Olov Adami, Garnet L Anderson, Theodore M Brasky, et al. “Analgesic Use and Ovarian Cancer Risk: An Analysis in the Ovarian Cancer Cohort Consortium.” *JNCI: Journal of the National Cancer Institute*, May 31, 2018. <https://doi.org/10.1093/jnci/djy100>.
- Trabert, Britton, Elizabeth M. Poole, Emily White, Kala Visvanathan, Hans-Olov Adami, Garnet L. Anderson, Theodore M. Brasky, et al. “Analgesic Use and Ovarian Cancer Risk: An Analysis in the Ovarian Cancer Cohort Consortium.” *Journal of the National Cancer Institute* 111, no. 2 (2019). <https://doi.org/10.1093/jnci/djy100>.
- Tsilidis, K K, N E Allen, T J Key, L Dossus, A Lukanova, K Bakken, E Lund, et al. “Oral Contraceptive Use and Reproductive Factors and Risk of Ovarian Cancer in the European Prospective Investigation into Cancer and Nutrition.” *British Journal of Cancer* 105, no. 9 (October 25, 2011): 1436–42. <https://doi.org/10.1038/bjc.2011.371>.
- Tsilidis, Konstantinos K., Naomi E. Allen, Timothy J. Key, Laure Dossus, Rudolf Kaaks, Kjersti Bakken, Eiliv Lund, et al. “Menopausal Hormone Therapy and Risk of Ovarian Cancer in the European Prospective Investigation into Cancer and Nutrition.” *Cancer Causes & Control: CCC* 22, no. 8 (August 2011): 1075–84. <https://doi.org/10.1007/s10552-011-9782-z>.
- Tworoger, Shelley S., Kathleen M. Fairfield, Graham A. Colditz, Bernard A. Rosner, and Susan E. Hankinson. “Association of Oral Contraceptive Use, Other Contraceptive Methods, and Infertility with Ovarian Cancer Risk.” *American Journal of Epidemiology* 166, no. 8 (October 15, 2007): 894–901. <https://doi.org/10.1093/aje/kwm157>.
- Tzonou, A., A. Polychronopoulou, C. C. Hsieh, A. Rebelakos, A. Karakatsani, and D. Trichopoulos. “Hair Dyes, Analgesics, Tranquilizers and Perineal Talc Application as Risk Factors for Ovarian Cancer.” *International Journal of Cancer. Journal International Du Cancer* 55, no. 3 (September 30, 1993): 408–10.
- US EPA. “Health Assessment Document for Talc. | National Technical Reports Library - NTIS.” - 600/8-91/217, 1992.
<https://ntrl.ntis.gov/NTRL/dashboard/searchResults/titleDetail/PB92239524.xhtml>.
- Van Gosen, B. S., H.A. Lowers, S.J. Sutley, and C.A. Gent. “Using the Geologic Setting of Talc Deposits as an Indicator of Amphibole Asbestos Content.” *Environmental Geology* 45, no. 7 (2004): 20. <https://doi.org/10.1007/s00254-003-0955-2>.
- Vanderhyden, Barbara C, Tanya J Shaw, and Jean-François Ethier. “Animal Models of Ovarian Cancer.” *Reproductive Biology and Endocrinology : RB&E* 1 (October 7, 2003): 67.
<https://doi.org/10.1186/1477-7827-1-67>.
- VanOrden, D. “Weight Percent Compositional Analysis of Seven RTV Talc Samples. Analytical Report to R. T. Vanderbilt Company, Inc. Submitted to Public Comments Record – C. W. Jameson, National Toxicology Program, 10th ROC Nominations ‘Talc (Containing Asbestiform Fibers)’. 4 December 2000., National Toxicology Program.,” November 22, 2000.
- Vasama-Neuvonen, K., E. Pukkala, H. Paakkulainen, P. Mutanen, E. Weiderpass, P. Boffetta, N. Shen, T. Kauppinen, H. Vainio, and T. Partanen. “Ovarian Cancer and Occupational Exposures in Finland.” *American Journal of Industrial Medicine* 36, no. 1 (July 1999): 83–89.
- Vasey, Paul A., Gordon C. Jayson, Alan Gordon, Hani Gabra, Rob Coleman, Ronnie Atkinson, David Parkin, et al. “Phase III Randomized Trial of Docetaxel-Carboplatin versus Paclitaxel-

- Carboplatin as First-Line Chemotherapy for Ovarian Carcinoma.” *Journal of the National Cancer Institute* 96, no. 22 (November 17, 2004): 1682–91. <https://doi.org/10.1093/jnci/djh323>.
- Venkatesan, Priya. “Possible X Chromosome-Linked Transmission of Ovarian Cancer.” *The Lancet. Oncology* 19, no. 4 (April 2018): e185. [https://doi.org/10.1016/S1470-2045\(18\)30183-9](https://doi.org/10.1016/S1470-2045(18)30183-9).
- Venter, P. F., and M. Iturralde. “Migration of a Particulate Radioactive Tracer from the Vagina to the Peritoneal Cavity and Ovaries.” *South African Medical Journal = Suid-Afrikaanse Tydskrif Vir Geneeskunde* 55, no. 23 (June 2, 1979): 917–19.
- Verdoodt, Freija, Christian Dehlendorff, Søren Friis, and Susanne K. Kjaer. “Non-Aspirin NSAID Use and Ovarian Cancer Mortality.” *Gynecologic Oncology* 150, no. 2 (2018): 331–37. <https://doi.org/10.1016/j.ygyno.2018.06.018>.
- Vicus, Danielle, Amy Finch, Barry Rosen, Isabel Fan, Linda Bradley, Ilana Cass, Ping Sun, et al. “Risk Factors for Carcinoma of the Fallopian Tube in Women with and without a Germline BRCA Mutation.” *Gynecologic Oncology* 118, no. 2 (August 1, 2010): 155–59. <https://doi.org/10.1016/j.ygyno.2010.03.009>.
- Vineis, Paolo, Phyllis Illari, and Federica Russo. “Causality in Cancer Research: A Journey through Models in Molecular Epidemiology and Their Philosophical Interpretation.” *Emerging Themes in Epidemiology* 14, no. 7 (2017). <https://doi.org/DOI 10.1186/s12982-017-0061-7>.
- Virta, RL. “The Phase Relationship of Talc and Amphiboles in a Fibrous Talc Sample.” IH; Report of Investigations, 1985. <https://www.cdc.gov/niosh/nioshtic-2/10004328.html>.
- Vitonis, Allison F., Linda Titus-Ernstoff, and Daniel W. Cramer. “Assessing Ovarian Cancer Risk When Considering Elective Oophorectomy at the Time of Hysterectomy.” *Obstetrics and Gynecology* 117, no. 5 (May 2011): 1042–50. <https://doi.org/10.1097/AOG.0b013e318212fcb7>.
- Wang, Chunpeng, Zhenzhen Liang, Xin Liu, Qian Zhang, and Shuang Li. “The Association between Endometriosis, Tubal Ligation, Hysterectomy and Epithelial Ovarian Cancer: Meta-Analyses.” *International Journal of Environmental Research and Public Health* 13, no. 11 (November 14, 2016): 1138. <https://doi.org/10.3390/ijerph13111138>.
- Wang, Xiaorong, Sihao Lin, Ignatius Yu, Hong Qiu, Yajia Lan, and Eiji Yano. “Cause-Specific Mortality in a Chinese Chrysotile Textile Worker Cohort.” *Cancer Science* 104, no. 2 (February 2013): 245–49. <https://doi.org/10.1111/cas.12060>.
- Watson, Ian R., Koichi Takahashi, P. Andrew Futreal, and Lynda Chin. “Emerging Patterns of Somatic Mutations in Cancer.” *Nature Reviews. Genetics* 14, no. 10 (October 2013): 703–18. <https://doi.org/10.1038/nrg3539>.
- Wehner, A. P., A. S. Hall, R. E. Weller, E. A. Lepel, and R. E. Schirmer. “Do Particles Translocate from the Vagina to the Oviducts and Beyond?” *Food and Chemical Toxicology: An International Journal Published for the British Industrial Biological Research Association* 23, no. 3 (March 1985): 367–72.
- Wehner, A. P., R. E. Weller, and E. A. Lepel. “On Talc Translocation from the Vagina to the Oviducts and Beyond.” *Food and Chemical Toxicology: An International Journal Published for the British Industrial Biological Research Association* 24, no. 4 (April 1986): 329–38.
- Weiss, W. “Cigarette Smoking and Lung Cancer Trends. A Light at the End of the Tunnel?” *Chest* 111, no. 5 (May 1997): 1414–16.
- Wentzensen, Nicolas, Elizabeth M. Poole, Britton Trabert, Emily White, Alan A. Arslan, Alpa V. Patel, V. Wendy Setiawan, et al. “Ovarian Cancer Risk Factors by Histologic Subtype: An Analysis From the Ovarian Cancer Cohort Consortium.” *Journal of Clinical Oncology: Official Journal of the American Society of Clinical Oncology* 34, no. 24 (2016): 2888–98. <https://doi.org/10.1200/JCO.2016.66.8178>.

- Werner, I. "Presence of Asbestos in Talc Samples." *Atenschutzinform* 21, no. 5 (1982).
- Whiteman, David C., Michael F. G. Murphy, Linda S. Cook, Daniel W. Cramer, Patricia Hartge, Polly A. Marchbanks, Philip C. Nasca, Roberta B. Ness, David M. Purdie, and Harvey A. Risch. "Multiple Births and Risk of Epithelial Ovarian Cancer." *Journal of the National Cancer Institute* 92, no. 14 (July 19, 2000): 1172–77. <https://doi.org/10.1093/jnci/92.14.1172>.
- Whittemore, A. S., R. Harris, and J. Itnyre. "Characteristics Relating to Ovarian Cancer Risk: Collaborative Analysis of 12 US Case-Control Studies. IV. The Pathogenesis of Epithelial Ovarian Cancer. Collaborative Ovarian Cancer Group." *American Journal of Epidemiology* 136, no. 10 (November 15, 1992): 1212–20.
- Whittemore, A. S., M. L. Wu, R. S. Paffenbarger, D. L. Sarles, J. B. Kampert, S. Grosser, D. L. Jung, S. Ballon, and M. Hendrickson. "Personal and Environmental Characteristics Related to Epithelial Ovarian Cancer. II. Exposures to Talcum Powder, Tobacco, Alcohol, and Coffee." *American Journal of Epidemiology* 128, no. 6 (December 1988): 1228–40.
- Whysner, J., and M. Mohan. "Perineal Application of Talc and Cornstarch Powders: Evaluation of Ovarian Cancer Risk." *American Journal of Obstetrics and Gynecology* 182, no. 3 (March 2000): 720–24.
- Wignall, B.K., and A.J. Fox. "Mortality of Female Gas Mask Assemblers." *British Journal of Industrial Medicine* 39, no. 1 (1982): 34–38.
- Wild, P. "Lung Cancer Risk and Talc Not Containing Asbestiform Fibres: A Review of the Epidemiological Evidence." *Occupational and Environmental Medicine* 63, no. 1 (January 2006): 4–9. <https://doi.org/10.1136/oem.2005.020750>.
- Wolff, Henrik, Tapio Vehmas, Panu Oksa, Jorma Rantanen, and Harri Vainio. "Asbestos, Asbestosis, and Cancer, the Helsinki Criteria for Diagnosis and Attribution 2014: Recommendations." *Scandinavian Journal of Work, Environment & Health* 41, no. 1 (January 2015): 5–15. <https://doi.org/10.5271/sjweh.3462>.
- Wong, C., R. E. Hempling, M. S. Piver, N. Natarajan, and C. J. Mettlin. "Perineal Talc Exposure and Subsequent Epithelial Ovarian Cancer: A Case-Control Study." *Obstetrics and Gynecology* 93, no. 3 (March 1999): 372–76.
- Woodruff, J. D. "The Pathogenesis of Ovarian Neoplasia." *The Johns Hopkins Medical Journal* 144, no. 4 (April 1979): 117–20.
- Wright, H. R., J. C. Wheeler, J. A. Woods, J. Hesford, P. Taylor, and R. F. Edlich. "Potential Toxicity of Retrograde Uterine Passage of Particulate Matter." *Journal of Long-Term Effects of Medical Implants* 6, no. 3–4 (1996): 199–206.
- Wu, A. H., C. L. Pearce, C.-C. Tseng, and M. C. Pike. "African Americans and Hispanics Remain at Lower Risk of Ovarian Cancer Than Non-Hispanic Whites after Considering Nongenetic Risk Factors and Oophorectomy Rates." *Cancer Epidemiology Biomarkers & Prevention* 24, no. 7 (July 1, 2015): 1094–1100. <https://doi.org/10.1158/1055-9965.EPI-15-0023>.
- Wu, Anna H., Celeste L. Pearce, Chiu-Chen Tseng, and Malcolm C. Pike. "African Americans and Hispanics Remain at Lower Risk of Ovarian Cancer Than Non-Hispanic Whites after Considering Nongenetic Risk Factors and Oophorectomy Rates." *Cancer Epidemiology, Biomarkers & Prevention: A Publication of the American Association for Cancer Research, Cosponsored by the American Society of Preventive Oncology* 24, no. 7 (July 2015): 1094–1100. <https://doi.org/10.1158/1055-9965.EPI-15-0023>.
- Wu, Anna H., Celeste L. Pearce, Chiu-Chen Tseng, Claire Templeman, and Malcolm C. Pike. "Markers of Inflammation and Risk of Ovarian Cancer in Los Angeles County." *International*

- Journal of Cancer. Journal International Du Cancer* 124, no. 6 (March 15, 2009): 1409–15.
<https://doi.org/10.1002/ijc.24091>.
- Wu, Song, Wei Zhu, Patricia Thompson, and Yusuf A. Hannun. “Evaluating Intrinsic and Non-Intrinsic Cancer Risk Factors.” *Nature Communications* 9, no. 1 (August 28, 2018): 3490.
<https://doi.org/10.1038/s41467-018-05467-z>.
- Yan, Bin, Yuanlin Peng, and Chuan-Yuan Li. “Molecular Analysis of Genetic Instability Caused by Chronic Inflammation.” *Methods in Molecular Biology (Clifton, N.J.)* 512 (2009): 15–28.
https://doi.org/10.1007/978-1-60327-530-9_2.
- Yan, Bin, Huili Wang, Zahid Rabbani, Yulin Zhao, Wenrong Li, Yuqing Yuan, Fang Li, Mark W. Dewhirst, and Chuan-Yuan Li. “Tumor Necrosis Factor- α Is a Potent Endogenous Mutagen That Promotes Cellular Transformation.” *Cancer Research* 66 (December 15, 2006): 11565.
- “You Can Steer Clients to Condoms Free from Potentially Harmful Talc: Condom Companies Agree to Produce without the Dry Lubricant.” *Contraceptive Technology Update* 16, no. 11 (November 1995): 133–44.
- Zazenski, R., W. H. Ashton, D. Briggs, M. Chudkowski, J. W. Kelse, L. MacEachern, E. F. McCarthy, M. A. Nordhauser, M. T. Roddy, and N. M. Teetsel. “Talc: Occurrence, Characterization, and Consumer Applications.” *Regulatory Toxicology and Pharmacology: RTP* 21, no. 2 (April 1995): 218–29.
- Zervomanoklakis, I, H.W. Ott, D Hadziomerovic, V. Mattle, B.E. Seeber, I. Virgolini, D. Heute, S. Kissler, G. Leyendecker, and L. Wildt. “Physiology of Upward Transport in the Human Female Genital Tract.” *Annals of New York Academy of Sciences* 1101, no. 1 (2007): 1–20.
<https://doi.org/10.1196/annals.1389.032>.
- Zhao, Weixing, Justin B. Steinfeld, Fengshan Liang, Xiaoyong Chen, David G. Maranon, Chu Jian Ma, Youngho Kwon, et al. “BRCA1-BARD1 Promotes RAD51-Mediated Homologous DNA Pairing.” *Nature* 550, no. 7676 (19 2017): 360–65. <https://doi.org/10.1038/nature24060>.

Exhibit C

Rebecca Smith-Bindman Compensation and Prior Testimony

Dr. Smith-Bindman's fees are \$1,000/hr. She has not testified in other cases during the previous four years.

Exhibit 36

Rebecca Smith-Bindman, M.D.

Page 1

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF NEW JERSEY

IN RE: JOHNSON & JOHNSON TALCUM
POWDER PRODUCTS MARKETING, SALES
PRACTICES, AND PRODUCTS LIABILITY
LITIGATION

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) MDL No.
) 2738 (FLW)(LHG)
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VIDEOTAPED DEPOSITION OF
REBECCA SMITH-BINDMAN, M.D.
San Francisco, California
Thursday, February 7, 2019
Volume I

Reported by:
MARY J. GOFF
CSR No. 13427

Rebecca Smith-Bindman, M.D.

<p style="text-align: right;">Page 2</p> <p>1 2 3 4 5 Videotaped Deposition of REBECCA 6 SMITH-BINDMAN, M.D., Volume I, taken on behalf of 7 Johnson & Johnson, at Levin Simes Abrams LLP, 8 1700 Montgomery Street, Suite 250, San Francisco, 9 California 94111, beginning at 9:20 a.m. and ending 10 at 4:01 p.m., on February 7, 2019, before MARY J. 11 GOFF, California Certified Shorthand Reporter No. 12 13427. 13 14 15 16 17 18 19 20 21 22 23 24 25</p>	<p style="text-align: right;">Page 4</p> <p>1 APPEARANCES (continued): 2 For Plaintiffs 3 Restaino Law LLC 4 BY: JOHN M. RESTAINO JUNIOR 5 Attorney at Law 6 130 Forest Street 7 Denver, Colorado 80220 8 jrestaino@restainollc.com 9 720-891-7921 10 11 12 For Defendant Johnson & Johnson 13 Tucker Ellis LLP 14 BY: MICHAEL C. ZELLERS 15 Attorney at Law 16 515 South Flower Street 17 42nd Floor 18 Los Angeles, California 90071 19 michael.zellers@tuckerellis.com 20 213-430-3301 21 22 23 24 25</p>
<p style="text-align: right;">Page 3</p> <p>1 APPEARANCES: 2 3 For Plaintiffs 4 Beasley Allen Law Firm 5 BY: P. LEIGH O'DELL 6 MARGARET M. THOMPSON, MD, JD, MPAff 7 Attorney at Law 8 218 Commerce Street 9 Montgomery, Alabama 36103 10 leigh.odell@beasleyallen.com 11 334-269-2343 12 For Plaintiffs 13 Robinson Calcagnie, Inc. 14 BY: CYNTHIA L. GARBER 15 Attorney at Law 16 19 Corporate Plaza Drive 17 Newport Beach, California 92660 18 cgarber@robinsonfirm.com 19 For Plaintiffs 20 Wilentz, Goldman & Spitzer P.A. 21 Daniel R. Lapinski 22 Attorney at Law 23 90 Woodbridge Center Drive, 24 Suite 900 Box 10 25 Woodbridge, New Jersey 07095-0958</p>	<p style="text-align: right;">Page 5</p> <p>1 APPEARANCES (continued): 2 For Defendant Johnson & Johnson 3 Skadden, Arps, Slate, Meagher & Flom, LLP. 4 BY: BENJAMIN HALPERIN 5 Attorney at Law 6 4 Times Square 7 New York, New York 10036 8 benjamin.halperin@skadden.com 9 212-735-2453 10 11 12 For Defendant Imerys 13 Dykema 14 BY: JANE BOCKUS 15 Attorney at Law 16 112 E. Pecan Street 17 Suite 1800 18 San Antonio, Texas 78205 19 jbockus@dykema.com 20 210-554-5549 21 22 23 24 25</p>

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Rebecca Smith-Bindman, M.D.

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2 For Defendant Imerys	2 WITNESS EXAMINATION
3 Gordon & Rees LLP	3 REBECCA SMITH-BINDMAN, M.D.
4 BY: JENNIFER A. FOSTER	4 Volume I
5 Attorney at Law	5
6 816 Congress Avenue	6 BY MR. ZELLERS 12
7 Suite 1510	7
8 Austin, Texas 78701	8 NUMBER DESCRIPTION PAGE
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14 Seyfarth Shaw, LLP	14
15 BY: JAMES R. BILLINGS-KANG	15 (Exhibit 4-11, premarked Hopkins Exhibit 28
16 Attorney at Law	16 (Spreadsheet) premarked Pier 47 (Exhibit Number
17 975 F Street, NW	17 list) and unmarked article "Pycnogenol Reduces
18 Washington, D.C. 20004	18 Talc-induced Neoplastic Transformation in Human
19 jbillingskang@seyfarth.com	19 Ovarian Cell Cultures" (Pltf_MISC_00000046) are
20 202-828-5356	20 contained in the blue folder)
21	21
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10 caroline.tinsley@tuckerellis.com	10 Exhibit 10 Alterations in Gene Expression article 37
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Page 11	Page 13
<p>1 San Francisco, California</p> <p>2 February 7, 2019</p> <p>3 9:20 a.m.</p> <p>4</p> <p>5 REBECCA SMITH-BINDMAN, M.D.,</p> <p>6 being first duly sworn or affirmed to testify to the</p> <p>7 truth, the whole truth, and nothing but the truth,</p> <p>8 was examined and testified as follows:</p> <p>9 THE VIDEOGRAPHER: We are now on the</p> <p>10 record. My name is Joseph morgue. I'm a</p> <p>11 videographer for Golkow Litigation Services.</p> <p>12 Today's date is February 7, 2019. The</p> <p>13 time on the video monitor is 9:20 a.m.</p> <p>14 This video deposition is being held at</p> <p>15 1700 Montgomery Street, Suite 250, San Francisco,</p> <p>16 California, in the matter In Re: Johnson & Johnson</p> <p>17 Talcum Powder Products Marketing, Sales Practices,</p> <p>18 and Products Liability Litigation, for the United</p> <p>19 States District Court, for the District of</p> <p>20 New Jersey.</p> <p>21 The deponent is Dr. Rebecca Smith-Bindman.</p> <p>22 Counsel will be noted on the stenographic record.</p> <p>23 The court reporter is Mary Goff. She will now</p> <p>24 administer the oath.</p> <p>25</p>	<p>1 understand, please don't answer it. Tell us you</p> <p>2 don't understand, and we'll rephrase the question or</p> <p>3 repeat it so it's clear to you.</p> <p>4 Can you do that?</p> <p>5 A I can.</p> <p>6 Q If you answer a question, is it fair for</p> <p>7 us to assume that you understood it?</p> <p>8 A It is.</p> <p>9 Q Please don't guess or speculate as to any</p> <p>10 answers. If you don't know the answer to a question</p> <p>11 or it would call you to guess or speculate, tell us.</p> <p>12 Can you do that?</p> <p>13 A I can.</p> <p>14 Q If at any time you need to take a break as</p> <p>15 we proceed through the day, please tell us. And</p> <p>16 once we finish whatever line of questioning we're</p> <p>17 involved with, then we will take a break.</p> <p>18 A Okay.</p> <p>19 Q Tell us the times that you have been</p> <p>20 deposed. When is the last time you were deposed?</p> <p>21 A I think approximately six years ago.</p> <p>22 Q What was the litigation or the matter?</p> <p>23 A I have been deposed a few times. I'm not</p> <p>24 sure which happened when --</p> <p>25 Q That's fine.</p>

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Rebecca Smith-Bindman, M.D.

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<p>1 A -- but I can tell you in general what they 2 were about. 3 Q Tell us -- the three to four times that 4 you have been deposed, will you tell us what each of 5 those matters was? 6 A Yes. I am in addition to being an 7 epidemiologist, I'm a clinical radiologist. And 8 each of those cases had to do with diagnosis and 9 communication within medical malpractice cases. 10 One case had to do with a delayed 11 diagnosis of breast cancer and not communicating 12 results. 13 One case had to do with a misdiagnosis of 14 a first trimester pregnancy loss. 15 One case had to do with misdiagnosis of a 16 complication of a twin/twin pregnancy. I think 17 those are the cases I was deposed in. 18 Q All of the cases in which you have been 19 deposed previously have been medical malpractice 20 cases? 21 A Yes. 22 Q Were those cases in which you had provided 23 treatment to a patient or were they cases in which 24 you were an expert witness independent of that 25 particular plaintiff?</p>	<p>1 A And -- and I was deposed. 2 MS. O'DELL: Excuse me. 3 Q (BY MR. ZELLERS) Yes. So three prior 4 litigations in which you served as an expert and you 5 were deposed; is that right? 6 A I -- 7 MS. O'DELL: Object to the form. I think 8 she said four, but -- 9 MR. ZELLERS: Well, she said three to 10 four. But then when she was telling us about those 11 cases -- 12 A -- so I remember what was fourth case was. 13 Q (BY MR. ZELLERS) All right. What was the 14 fourth case? 15 A There was a case of delay in the diagnosis 16 of an ovarian cancer. 17 Q Where was that case? 18 A Somewhere in the middle of the country. 19 Q When did you testify in that case? 20 A I -- I only testified in a single case. 21 So it -- do you mean deposed? 22 Q Yes. When were you deposed in that case? 23 A I -- sometime between -- all of the cases 24 were sometime between six and 12 years ago. I'm 25 not --</p>
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<p>1 A For each of those cases, I was an expert 2 witness. I had never personally been involved in a 3 medical malpractice cases. 4 Q Were each of those cases in the 5 San Francisco area or where were they located? 6 A None of those cases were in the 7 San Francisco area. One of them was in Huntsville 8 Alabama, one was in Northern California, and one was 9 in Southern California. 10 Q Do you remember the names of any of those 11 cases? 12 A I do not. 13 Q Do you remember the name of the lawyer or 14 lawyers that you worked with in those cases? 15 A I do not. 16 Q Did you testify in those cases on behalf 17 of the plaintiff or on behalf of a defendant? 18 A They were split. So I have been involved 19 in cases on both sides. 20 Q Well, my understanding is you have been 21 involved in three prior litigations; is that right 22 -- 23 MS. O'DELL: Object to the form. 24 Q (BY MR. ZELLERS) -- in which you served as 25 an expert witness and were deposed?</p>	<p>1 Q All right. Did -- 2 A -- sure I remember the years. 3 Q The case in which you testified as an 4 expert witness in the delay of diagnosis of ovarian 5 cancer, were you testifying for the defense or for 6 the plaintiff? 7 A I believe that case was for the defense. 8 Q Do you remember the name of the plaintiff? 9 A I do not. 10 Q Do you remember the name of the defendant? 11 A I do not. 12 Q Do you remember the name of the attorney 13 who retained you? 14 A I do not. 15 Q Do you remember where in the middle of the 16 country that case was pending? 17 A I do not. 18 Q You stated that you have testified one 19 time at trial; is that right? 20 A Yes. 21 Q Where did you testify at trial? 22 A That was Huntsville -- the Fayetteville, 23 Alabama case. 24 Q In that case, did you testify for the 25 plaintiff or the defense?</p>

5 (Pages 14 to 17)

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<p style="text-align: right;">Page 18</p> <p>1 A For the plaintiff.</p> <p>2 Q Do you remember how long ago it was?</p> <p>3 A In the ballpark of seven or eight years</p> <p>4 ago.</p> <p>5 Q The Northern California case that you gave</p> <p>6 deposition testimony in that -- in, was that for the</p> <p>7 plaintiff or the defense?</p> <p>8 A I don't remember.</p> <p>9 Q Southern California, that medical</p> <p>10 malpractice case, did you testify for the plaintiff</p> <p>11 or the defense?</p> <p>12 A Can I go back? I -- I do remember.</p> <p>13 So the Northern California case was the</p> <p>14 plaintiff. The Southern California case was the</p> <p>15 defense.</p> <p>16 Q Do you remember the attorneys that you</p> <p>17 worked with in the Northern California case?</p> <p>18 A I do not.</p> <p>19 Q The Southern California case?</p> <p>20 A I do not.</p> <p>21 Q Do you remember the name of any of the</p> <p>22 parties in any of the cases in which you have either</p> <p>23 given deposition testimony in or trial testimony in?</p> <p>24 A I do not.</p> <p>25 Q Today I'm going to ask you questions about</p>	<p style="text-align: right;">Page 20</p> <p>1 A Yes.</p> <p>2 Q You are not testifying here today as a</p> <p>3 radiologist; is that right?</p> <p>4 MS. O'DELL: Object to the form.</p> <p>5 A I think some of my experiences as a</p> <p>6 radiologist are highly relevant to my expertise, and</p> <p>7 so there are some questions that I think that that</p> <p>8 is very relevant.</p> <p>9 Q (BY MR. ZELLERS) Are there any areas in</p> <p>10 which you anticipate providing expert testimony in</p> <p>11 this litigation, other than in the areas of</p> <p>12 epidemiology and radiology?</p> <p>13 MS. O'DELL: Object to the form.</p> <p>14 A I mentioned ovarian cancer. So risk</p> <p>15 factors for ovarian cancer falls into epidemiology.</p> <p>16 The mechanism of ovarian cancer, the</p> <p>17 pathophysiology, the biological processes are not</p> <p>18 technically epidemiology. They're related, and so</p> <p>19 some of my opinions, I think, would fall into that</p> <p>20 category.</p> <p>21 Q (BY MR. ZELLERS) How would you define that</p> <p>22 area of expertise for which you are providing expert</p> <p>23 opinions?</p> <p>24 MS. O'DELL: Object to the form.</p> <p>25 Q (BY MR. ZELLERS) We have got that you are</p>
<p style="text-align: right;">Page 19</p> <p>1 talcum powder or baby powder. Can we agree that</p> <p>2 when I refer during the deposition to products, to</p> <p>3 talc products, talcum powder products, baby powder,</p> <p>4 or Shower to Shower at issue in this MDL, that I am</p> <p>5 referring to the baby powder product manufactured by</p> <p>6 Johnson & Johnson Consumer Products, Inc., and the</p> <p>7 Shower to Shower product that was formerly</p> <p>8 manufactured by Johnson & Johnson Consumer Products,</p> <p>9 Inc.?</p> <p>10 A Yes.</p> <p>11 Q How would you define the area of expertise</p> <p>12 in which you were offering opinions in this case,</p> <p>13 "this case" being the talc MDL?</p> <p>14 A I was asked to provide an expert review in</p> <p>15 the area of epidemiology, ovarian cancer and its</p> <p>16 causes, the health effects of talc powder products.</p> <p>17 I think those are the main areas.</p> <p>18 Q Are -- are you testifying today as an</p> <p>19 epidemiologist?</p> <p>20 A Yes.</p> <p>21 MS. O'DELL: Object to --</p> <p>22 A Am --</p> <p>23 MS. O'DELL: -- the form.</p> <p>24 A -- I bringing expertise to that?</p> <p>25 Q (BY MR. ZELLERS) Yes.</p>	<p style="text-align: right;">Page 21</p> <p>1 going to provide expert opinions relating to</p> <p>2 epidemiology. You're going to provide expert</p> <p>3 opinions relating to radiology.</p> <p>4 Are there any other areas that you intend</p> <p>5 to provide expert opinions in?</p> <p>6 MS. O'DELL: Other than what she has just</p> <p>7 described?</p> <p>8 Q (BY MR. ZELLERS) Well, other than</p> <p>9 epidemiology and radiology.</p> <p>10 MS. O'DELL: Object to the form. She gave</p> <p>11 another -- a host -- a suite of things she expected</p> <p>12 to testify on, but --</p> <p>13 MR. ZELLERS: And so --</p> <p>14 MS. O'DELL: -- I'll object to the form.</p> <p>15 MR. ZELLERS: -- yeah, thank you.</p> <p>16 A Could you repeat back to me what I have</p> <p>17 already said?</p> <p>18 Q (BY MR. ZELLERS) No. I'm asking you what</p> <p>19 you are going to provide expert testimony in, what</p> <p>20 you consider yourself to be an expert in.</p> <p>21 I understand epidemiology, and I</p> <p>22 understand the epidemiology opinions you are going</p> <p>23 to give, relate to whether or not talcum powder is</p> <p>24 associated with ovarian cancer, whether or not</p> <p>25 talcum powder causes ovarian cancer, so I believe</p>

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<p>1 those are epidemiology-based opinions. 2 I also understand that you have a -- your 3 training and your background is in radiology and 4 that you will provide, to the extent relevant, 5 radiology opinions. 6 But you're not testifying here today as a 7 gynecologic oncologist, are you? 8 A I am not. 9 Q You are not testifying here today as an 10 expert in asbestos; is that fair? 11 MS. O'DELL: Object to the form. 12 A I am going to provide opinions, if asked, 13 about the health effects of asbestos. 14 Q (BY MR. ZELLERS) Are you an expert or do 15 you consider yourself to be an expert in asbestos? 16 MS. O'DELL: Object to the form. 17 A The question is about asbestos, in 18 general, and I consider myself an expert on the 19 health effects of asbestos. 20 Q (BY MR. ZELLERS) Does that mean that you 21 are an expert in asbestos or simply looking at 22 studies that have evaluated the epidemiology of 23 asbestos and asbestos exposure to certain 24 conditions? 25 MS. O'DELL: Object to the form.</p>	<p>1 Q -- not an expert -- well -- and let me 2 withdraw that. 3 You have produced an expert report in this 4 case; is that right? 5 A I have. 6 Q Let's mark a couple of things at the 7 outset. 8 Deposition Exhibit 1 is copy of the Notice 9 of Deposition. 10 (Exhibit 1 was marked for identification 11 and is attached to the transcript.) 12 MS. O'DELL: Thank you. 13 Q (BY MR. ZELLERS) Have you seen the Notice 14 of Deposition prior to today? 15 A Yes, I have. 16 Q Have you either brought with you or 17 through counsel have they brought all of the 18 materials that you believe are responsive to the 19 Deposition Notice? 20 MR. ZELLERS: And, Ms. O'Dell, I recognize 21 that you have objected to the Deposition Notice and 22 the record will reflect that. 23 MS. O'DELL: And just so I have a chance 24 to say something, we'll just reassert those 25 objections now.</p>
Page 23	Page 25
<p>1 A I think there are a lot of acts -- aspects 2 of asbestos, so I would absolutely not consider 3 myself an expert on the geology of asbestos or in 4 the mechanism of mining asbestos. 5 But I would consider myself an expert on 6 the changes to the body that can be the result of 7 exposure to asbestos in the context of epidemiology 8 studies, but also in the context of molecular 9 changes, cellular changes like that. 10 And -- and those technically are probably 11 not in the category of epidemiology, but would 12 overlap other areas of my training and experience, 13 such as pathology and... 14 Q You are not an expert in the testing of 15 asbestos; is that fair? 16 A I -- I would, yes, agree. 17 Q You are not an expert in the different 18 forms and types of asbestos -- 19 A I -- 20 Q -- correct? 21 A -- I -- correct. 22 Q Okay. 23 A I'm not an expert in those types of -- 24 Q You are -- 25 A -- asbestos.</p>	<p>1 Dr. Smith-Bindman has brought with her 2 documents subject to our objections. 3 MR. ZELLERS: And I would really like 4 Dr. Smith-Bindman to answer the question. 5 MS. O'DELL: I'm sure she's ready to do 6 that. 7 A To the best of my knowledge, I have 8 responded or brought or provided all of -- 9 Q (BY MR. ZELLERS) You -- 10 A -- those items. 11 Q -- you are not aware of items that are 12 called for in the Deposition Notice, what we have 13 marked as Exhibit 1 that have not been produced or 14 not available here today; is that right? 15 A That's correct. 16 Q Ms. O'Dell and I spoke earlier about your 17 invoices, and apparently you do have some invoices 18 relating to your work in this matter. At some point 19 today we'll collect those and we will mark those. 20 (Exhibit 2 was marked for identification 21 and is attached to the transcript.) 22 Q (BY MR. ZELLERS) Deposition Exhibit 2 is 23 your report in this matter; is that right? 24 MS. O'DELL: Thank you. 25 A Okay. Yes.</p>

7 (Pages 22 to 25)

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<p style="text-align: right;">Page 26</p> <p>1 Q (BY MR. ZELLERS) Does your report in this 2 matter, Deposition Exhibit 2, contain all of the 3 opinions that you intend to offer at trial or at any 4 hearing in this matter? 5 A The report summarizes my opinions. I have 6 written in the report. As new information comes 7 available, I may take that into account as well. 8 So when we began, counsel mentioned a few 9 additional papers that I had seen since the time my 10 report was written. And so those are -- are -- 11 won't -- have not changed my views, but those are 12 not necessarily referenced in this report. 13 Q In terms of your opinions and the opinions 14 that you expect to render in this matter, either at 15 trial or any hearing, those opinions are contained 16 in your report which we marked as Exhibit 2, 17 correct? 18 MS. O'DELL: Object to the form. 19 A I have not, since writing my report, seen 20 any documents that have changed my opinions. 21 But as I continue to keep up with the 22 published literature, my opinions may reflect 23 changing documents that I have seen since the time 24 my report was generated. 25</p>	<p style="text-align: right;">Page 28</p> <p>1 Q Okay. Right now all I want to do is get a 2 list of what you have looked at and considered since 3 you prepared your report. 4 A I have seen an updated testing report by 5 Mr. Longo. 6 I have seen a report and deposition by 7 Mr. Cooke. I -- I think those are the... 8 Q You -- counsel for Plaintiffs, Ms. O'Dell, 9 told me before the deposition that you also have 10 looked at a health assessment from Health Canada or 11 a risk assessment; is -- is that correct? 12 A Yes, that's correct. 13 Q All right. Did you also look at a 14 meta-analysis that was performed or at least the 15 draft of a meta-analysis by the first name, author, 16 Thayer (phonetic)? 17 A I -- I saw that report briefly. 18 Q Anything else that you have reviewed 19 and/or considered that is not included in the 20 materials that you reference either in your list of 21 references or in your Materials Considered List? 22 A There was also a series of reports in -- 23 in The New York Times and Reuters and a summary of 24 that in the BMJ, which I have seen since I have 25 issued my report.</p>
<p style="text-align: right;">Page 27</p> <p>1 Q (BY MR. ZELLERS) All I can do is ask you 2 questions today. As of today, does your report 3 contain the opinions that you expect to provide at 4 any trial or hearing in this matter? 5 A Yes, they do. 6 Q My understanding from one of your prior 7 answers is that you have reviewed some additional 8 materials since you prepared and signed your report 9 on or about November 15 of 2018; is that right? 10 A That is correct. 11 Q Those materials, you believe, support the 12 opinions that you have put in your report, but have 13 not changed your opinions; is -- 14 A It -- 15 Q -- that right? 16 A -- that's correct. 17 Q What new or additional materials have you 18 reviewed and considered since preparing your report 19 on November 15, 2018? 20 A So I have seen a draft of a publication -- 21 submitted for publication by Dr. Saed about the 22 cellular and molecular changes to cell lines of 23 being exposed to various talcum powder products, 24 which I think is an important paper that has 25 influenced my views.</p>	<p style="text-align: right;">Page 29</p> <p>1 Q Are you basing any of your opinions on the 2 Reuters or New York Times articles? 3 A Those reports support my opinions, but no, 4 I'm not basing my report on -- on those. 5 Q Ms. O'Dell also provided me with a list 6 materials that she has represented that you have 7 reviewed since you prepared your report. 8 It's a series of Imerys documents. It's 9 one J&J produced document. And then the last item 10 listed is an Amended Expert Report of Robert Cooke. 11 Have you reviewed those materials since 12 preparing your report? 13 A So yes, the -- the Mr. Cooke report, which 14 is one I mentioned. Yes, I have seen the Imerys 15 report. And I can't remember what you said, the 16 Johnson & Johnson? 17 Q Are those additional documents or 18 materials that you have reviewed since preparing 19 your report? 20 A I'm sorry. I understand the question. I 21 don't remember what the Johnson & Johnson material 22 was. 23 Q I -- 24 A You listed it. I just don't -- 25 Q -- well, I didn't --</p>

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<p style="text-align: right;">Page 30</p> <p>1 A -- remember that.</p> <p>2 Q -- list it. This was a list that was</p> <p>3 prepared and provided to me by counsel for</p> <p>4 Plaintiffs so --</p> <p>5 MS. O'DELL: But I don't think he</p> <p>6 characterized the documented in any way other than</p> <p>7 the Bates number, so -- so it's a J&J document --</p> <p>8 A What is that item?</p> <p>9 MS. O'DELL: -- that's just the Bates</p> <p>10 number for that particular document. And it's</p> <p>11 the -- the test results that you reviewed yesterday.</p> <p>12 A Yes.</p> <p>13 (Exhibit 3 was marked for identification</p> <p>14 and is attached to the transcript.)</p> <p>15 Q (BY MR. ZELLERS) Are all of the documents</p> <p>16 contained on Exhibit 3, the -- a listing that was</p> <p>17 put together by counsel for the Plaintiffs,</p> <p>18 documents that you reviewed yesterday in preparation</p> <p>19 for your deposition today?</p> <p>20 A Yes.</p> <p>21 Q Are those documents that were selected by</p> <p>22 plaintiffs' counsel to show you to help prepare you</p> <p>23 for the deposition?</p> <p>24 MS. O'DELL: Object to the form.</p> <p>25 A The document are ones that I asked for to</p>	<p style="text-align: right;">Page 32</p> <p>1 is that right?</p> <p>2 A Yes, I did.</p> <p>3 MS. O'DELL: Object to the form.</p> <p>4 Q (BY MR. ZELLERS) You asked for documents</p> <p>5 that were both positive and negative relating that</p> <p>6 testing; is that right?</p> <p>7 A Yes.</p> <p>8 Q Do you believe that you have now seen, as</p> <p>9 part of your review, all documents relating to the</p> <p>10 testing of Johnson's baby powder and/or Shower to</p> <p>11 Shower powder?</p> <p>12 A I --</p> <p>13 MS. O'DELL: Object to the form.</p> <p>14 A -- I do not believe I have seen the</p> <p>15 entirety of the testing results.</p> <p>16 Q (BY MR. ZELLERS) Was it your request that</p> <p>17 you see whatever pertinent documents that were</p> <p>18 relating to the testing of the baby powder?</p> <p>19 A It was not my request. I wanted to</p> <p>20 understand, in general, what kind of testing had</p> <p>21 been done. I -- I was not planning to delve into</p> <p>22 the entirety of testing.</p> <p>23 Q Any other materials that you have reviewed</p> <p>24 prior -- strike that -- subsequent to preparing your</p> <p>25 report, which we marked as Exhibit 2?</p>
<p style="text-align: right;">Page 31</p> <p>1 see testing results, both positive and negative,</p> <p>2 from Johnson & Johnson. So I requested documents</p> <p>3 that would show that, and I believe that's what each</p> <p>4 of these were provided for.</p> <p>5 Q When did you make that request to</p> <p>6 plaintiffs' counsel?</p> <p>7 MS. O'DELL: And Mr. Zellers is -- he can</p> <p>8 ask you when you made the request. In terms of the</p> <p>9 specifics of the request or conversations with</p> <p>10 counsel, those would be protected, and I would</p> <p>11 instruct you not to -- to disclose those.</p> <p>12 A To not say when I read the request?</p> <p>13 MS. O'DELL: You can say when you gave the</p> <p>14 request. But the substance of the request or the</p> <p>15 substance of the discussions, I would have ask you</p> <p>16 not to --</p> <p>17 A Okay.</p> <p>18 MS. O'DELL: -- testify to those.</p> <p>19 Q (BY MR. ZELLERS) My question again is:</p> <p>20 When did you make the request for the documents that</p> <p>21 are identified on Exhibit 3?</p> <p>22 A I believe it was a few weeks ago.</p> <p>23 Q You made a request for testing documents</p> <p>24 of talcum powder used in Johnson & Johnson Consumer,</p> <p>25 Inc., baby powder or former Shower to Shower powder;</p>	<p style="text-align: right;">Page 33</p> <p>1 A None that come to mind.</p> <p>2 Q You have brought with you here today</p> <p>3 several notebooks and it looks like a blue folder;</p> <p>4 is that right?</p> <p>5 A Yes.</p> <p>6 Q What is contained in the blue folder that</p> <p>7 you brought here today?</p> <p>8 A Primarily in the blue folder are either</p> <p>9 additional documents that I have reviewed since I</p> <p>10 wrote my report, but also a few documents that -- in</p> <p>11 preparation for the deposition, I went through my</p> <p>12 report and pulled some articles to look at in</p> <p>13 greater depth, and so I brought those with --</p> <p>14 Q So --</p> <p>15 A -- me.</p> <p>16 Q -- in the blue folder are materials that</p> <p>17 you pulled out to have available for the deposition</p> <p>18 today for your use as needed in responding to</p> <p>19 questions that were asked?</p> <p>20 A Yes, that's correct.</p> <p>21 Q Can I see you blue folder, please? And,</p> <p>22 Dr. Smith-Bindman, have you taken any medications</p> <p>23 that impair your ability to answer questions today?</p> <p>24 A I have not.</p> <p>25 Q All right. The first document in your</p>

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<p style="text-align: right;">Page 34</p> <p>1 blue folder is a document, "Reproductive Sciences"</p> <p>2 at the top, "Molecular basis Supporting the</p> <p>3 Association of Talcum Powder Use with Increased Risk</p> <p>4 of Ovarian Cancer."</p> <p>5 The first named author is Nicole Fletcher.</p> <p>6 And is this the article by Dr. Saed that</p> <p>7 you sold me about?</p> <p>8 A Yes, it is.</p> <p>9 Q There are a number of notes and</p> <p>10 highlighting that are contained in the document.</p> <p>11 Are all of those your notes and highlighting?</p> <p>12 A They are.</p> <p>13 Q We'll mark your copy of Dr. Saed's paper</p> <p>14 as Exhibit 4.</p> <p>15 (Exhibit 4 was marked for identification</p> <p>16 and is attached to the transcript.)</p> <p>17 Q (BY MR. ZELLERS) The next paper in your</p> <p>18 blue folder that you brought here today is a</p> <p>19 document with the first named author, Fiume,</p> <p>20 F I U M E. The title is "Safety Assessment of Talc</p> <p>21 as Used in Cosmetics."</p> <p>22 It appeared in the International Journal</p> <p>23 of Toxicology. Again, there's highlighting in the</p> <p>24 document and underlying lining.</p> <p>25 Did you do the highlighting and did you do</p>	<p style="text-align: right;">Page 36</p> <p>1 Are those your notations?</p> <p>2 A Yes, they are.</p> <p>3 Q All right. We'll mark that as Exhibit 7.</p> <p>4 (Exhibit 7 was marked for identification</p> <p>5 and is attached to the transcript.)</p> <p>6 (Exhibit 8 was marked for identification</p> <p>7 and is attached to the transcript.)</p> <p>8 Q (BY MR. ZELLERS) Exhibit 8 are the</p> <p>9 classifications of the International Agency for</p> <p>10 Research on Cancer or IARC.</p> <p>11 Are you generally familiar with the IARC</p> <p>12 classifications relating to the carcino --</p> <p>13 carcinogenicity of different agents?</p> <p>14 A I am.</p> <p>15 Q The next document in your folder that also</p> <p>16 has some underlining and highlighting is on "Talc</p> <p>17 Translocation from the Vagina to the Oviducts and</p> <p>18 Beyond."</p> <p>19 (Exhibit 9 was marked for identification</p> <p>20 and is attached to the transcript.)</p> <p>21 Q (BY MR. ZELLERS) This is an article that</p> <p>22 was published in 1985. The first named author is</p> <p>23 A.P. Wehner.</p> <p>24 Is this also a document that you brought</p> <p>25 here today?</p>
<p style="text-align: right;">Page 35</p> <p>1 the underlining in this document?</p> <p>2 A Yes, I did.</p> <p>3 Q We'll mark that document, your copy, as</p> <p>4 Exhibit 5.</p> <p>5 (Exhibit 5 was marked for identification</p> <p>6 and is attached to the transcript.)</p> <p>7 Q (BY MR. ZELLERS) I see here that there is</p> <p>8 the IARC monograph dated 2010 on the evaluation of</p> <p>9 carcinogenic risk to humans.</p> <p>10 The bottom part of page 1 is torn off. Do</p> <p>11 you know why that is?</p> <p>12 A I do not.</p> <p>13 Q All right. So the first page gives a date</p> <p>14 reference of 2010. The second page gives -- well,</p> <p>15 it also lists a 2006 date and a 2010 date. There is</p> <p>16 highlighting throughout.</p> <p>17 Whose highlighting is contained in the</p> <p>18 document that we'll mark as Exhibit 6?</p> <p>19 A That would be mine.</p> <p>20 (Exhibit 6 was marked for identification</p> <p>21 and is attached to the transcript.)</p> <p>22 Q (BY MR. ZELLERS) We then have a news</p> <p>23 article from the British Medical Journal that was</p> <p>24 published December 28 of 2008. It's just a one-page</p> <p>25 document with underlining and writing on it.</p>	<p style="text-align: right;">Page 37</p> <p>1 A It is.</p> <p>2 Q The highlighting in the document, is that</p> <p>3 your document -- strike that.</p> <p>4 Is that your highlighting?</p> <p>5 A It -- it is.</p> <p>6 Q Are all of these documents either on your</p> <p>7 reference list or on your Materials Considered List,</p> <p>8 other than what you told us about at the start of</p> <p>9 the deposition?</p> <p>10 A Yes.</p> <p>11 Q We have Deposition Exhibit 47 from the</p> <p>12 Pier deposition. I will not mark that.</p> <p>13 We have an article here by Shukla,</p> <p>14 S H U K L A, "Alterations in Gene Expression in</p> <p>15 Human Mesothelial Cells Correlate with Mineral</p> <p>16 Pathogenicity."</p> <p>17 (Exhibit 10 was marked for identification</p> <p>18 and is attached to the transcript.)</p> <p>19 Q (BY MR. ZELLERS) Is that a document that</p> <p>20 you brought here today?</p> <p>21 A Yes, it is.</p> <p>22 Q Are the highlights and writing on that</p> <p>23 document yours?</p> <p>24 A Yes, they are.</p> <p>25 Q You have an article by Biz'Zard that was</p>

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<p>1 published in -- is that -- Phytotherapy Research, 2 2007; is that right? 3 A Yes. 4 Q There do not appear to be any handwriting 5 on that document, so I won't mark it. 6 We have got the Hopkins Deposition 7 Exhibit 28. There's no highlighting on that 8 document. 9 And then we have the "Draft Screening 10 Assessment" from Health Canada dated December 2018. 11 Is the highlighting in that document 12 yours? 13 A Yes, it is. 14 Q All right. We'll mark that as 15 Deposition Exhibit 11. 16 (Exhibit 11 was marked for identification 17 and is attached to the transcript.) 18 Q (BY MR. ZELLERS) Have we covered all of 19 the documents that you have brought with you today 20 in your blue folder? 21 A Yes. 22 Q All right. Let me see your two notebooks 23 that you also have brought with you today. One 24 notebook is "Talc Articles I." The second notebook 25 is "Talc Articles II."</p>	<p>1 Q Did you have any staff that helped you in 2 terms of your review of materials and preparation of 3 your report other -- other than Dr. Hall? 4 A I had a copy editor -- once I had a draft 5 of my report -- review it. 6 Q Who is your copy editor? 7 A Her name is Chris Tachibana. 8 Q And where is she employed? 9 A She is a freelance medical copy editor. 10 Q What role did she play in your review and 11 analysis of materials and your -- the preparation of 12 your report? 13 A So she played no role in the review -- or 14 the drafting of the report, but she reviewed a draft 15 near the end for grammatical issues to remove 16 redundancy. 17 She's someone I work with a great deal for 18 my medical publications, and so -- 19 Q You have worked with her in the past -- I 20 -- 21 A That's right -- 22 Q -- is that right? 23 A -- yes. 24 Q Is she here in the San Francisco area? 25 A She is not.</p>
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<p>1 Are all of the articles that are contained 2 in these two notebooks, articles that are contained 3 either on your reference list or on your reliance 4 materials list? 5 A Yes, they are. 6 Q As I go through this quickly, it appears 7 that there is underlining and highlighting of the 8 articles that you have brought here today; is that 9 right? 10 A Yes, it is. 11 Q Is all of the highlighting and underlining 12 and marking, are those your highlights and marking? 13 A Yes, they are. 14 Q Who prepared the notebooks? And let's 15 mark Talc Articles I, the entire notebook as 16 Exhibit 12. 17 (Exhibit 12 was marked for identification 18 and is attached to the transcript.) 19 Q (BY MR. ZELLERS) Talc Articles II, the 20 entire notebook, as Exhibit 13. 21 (Exhibit 13 was marked for identification 22 and is attached to the transcript.) 23 Q (BY MR. ZELLERS) Who prepared Exhibits 12 24 and 13 for you? 25 A I did.</p>	<p>1 Q Where is she located? 2 A She splits her time between Seattle, 3 Washington, and Germany. 4 Q She charges for her services; is that 5 right? 6 A She does. 7 Q Are those charges that you paid or that 8 were paid by plaintiffs' counsel? 9 A They have not yet been paid, but the plan 10 is for her to submit those invoices. And it will 11 come out of my fees, but will be paid by the 12 counsel. 13 Q All right. When you submit invoices, 14 will -- the charges for the copy editor, will those 15 be included in your invoice to plaintiffs' counsel? 16 A My plan is for it to come out of my fee. 17 So I am paying for it, but it should be literally 18 paid by counsel, since I'm not able to pay and 19 deduct taxes or pay taxes or -- or so -- or... 20 Q All right. You will pay it out of your 21 pocket and will not include it on your statement to 22 plaintiffs' counsel; is that right? 23 A That's correct. 24 Q Approximately how much have you paid or 25 will you pay to your copy editor?</p>

11 (Pages 38 to 41)

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<p style="text-align: right;">Page 42</p> <p>1 A I believe the total is in the ballpark of 2 about 1,500 or \$1,700. 3 Q How about Dr. Hall? Are her fees being 4 paid by you or are they being paid by plaintiffs' 5 counsel? 6 A Her fees are being paid by counsel. 7 Q Dr. Hall either has or will submit her own 8 separate invoice relating to her work on this 9 matter? 10 A Yes. 11 Q Has she already done that? 12 A I believe she has submitted it. I -- I'm 13 not 100 percent sure. 14 Q Do you know what Dr. Hall's fees are at 15 least through the present time relating to her work 16 on this matter? 17 A I believe the amount is in the ballpark of 18 the same 1,500 to \$2,000. 19 Q You believe, though, that Dr. Hall either 20 has or will be submitting invoice -- an invoice 21 separately for her work to plaintiffs' counsel; is 22 that right? 23 A Yes. 24 Q You have submitted invoices; is that 25 right?</p>	<p style="text-align: right;">Page 44</p> <p>1 Q What did that lawyer tell you or ask you 2 about this engagement? 3 A They told me that there was a -- a case 4 that they would like some epidemiology research on 5 and that they thought I would be a very good fit and 6 would I be willing to speak with them. 7 I don't believe they even told me what the 8 content of -- of the case was about, but rather, 9 that it was a case. And the role that they were 10 seeking was as an epidemiologist, not as a 11 radiologist or on the medical care. 12 Q Was this a phone call or an e-mail or how 13 did they contact you? 14 A I believe it was a short e-mail followed 15 by a short phone call. 16 Q I mean, do you keep those e-mails? And if 17 at some point we ask for them to be produced, is 18 that something you could do? 19 A For the particular e-mail that you are 20 asking about, I cannot find it. So I don't have 21 that. I looked. 22 Q You were contacted by a lawyer or law 23 firm, asked if you would be willing. 24 You said you would be willing without even 25 knowing what the matter related to?</p>
<p style="text-align: right;">Page 43</p> <p>1 A I have. 2 Q When were you first retained in this 3 matter -- well, strike that. 4 When were you first contacted with 5 respect to this litigation, the talcum powder MDL? 6 A My recollection is mid-2017. 7 Q Who contacted you in mid-2017? 8 A I was initially contacted by a law firm 9 that I believe was helping the law firms find expert 10 witnesses and asked if I would be willing to speak 11 with them to see if this could be something that I 12 would be interested in doing. 13 Q What law firm or lawyer contacted you 14 initially in mid-2017? 15 A I -- I don't remember that initial 16 contact. 17 Q You don't remember the name of the lawyer 18 or the law firm that initially contacted you in this 19 matter? 20 A The initial law firm basically asked me if 21 I would be willing to speak to these lawyers, and I 22 do not know the name of that lawyer who originally 23 contacted me. 24 Q Did you ever speak to that lawyer again? 25 A No.</p>	<p style="text-align: right;">Page 45</p> <p>1 A I didn't say I would be willing to be an 2 expert. I said I would be willing to have a 3 conversation with the lawyers to learn about the 4 case. 5 Q Were you told at that time that the case 6 related to talcum powder? 7 A I was not. 8 Q Were you told at that time that the 9 medical issue in the case related to ovarian cancer? 10 A I do not believe I was. 11 Q What is the next contact then that you had 12 with any lawyer relating to this matter? 13 A So then a phone call was set up between 14 myself and, I believe it was, three lawyers involved 15 in this litigation and told about the -- what the -- 16 what the case was about and told what they were 17 looking for to see if I would be interested in 18 speaking with them. 19 And that lead to an in-person meeting 20 where we then discussed what the case was about. 21 Q When was the phone call with the three 22 attorneys? 23 A All of this was in mid-2017, June-July 24 time frame. 25 Q The same question. When was the in-person</p>

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<p>1 meeting?</p> <p>2 A Within that same -- maybe a month later,</p> <p>3 but same time frame.</p> <p>4 Q Was the in-person -- strike that.</p> <p>5 Where was the in-person meeting?</p> <p>6 A It was in my office in San Francisco.</p> <p>7 Q Who were the three attorneys that you</p> <p>8 spoke with initially over the phone and then met</p> <p>9 with in person?</p> <p>10 A So Dr. Thompson was one; John Restaino was</p> <p>11 one; and a third lawyer whose name is alluding me.</p> <p>12 Q Was it a man or a woman?</p> <p>13 A A woman.</p> <p>14 Q Is it a lawyer that you have had any</p> <p>15 further contact with or communications with?</p> <p>16 A Yes.</p> <p>17 Q But you can't remember her name?</p> <p>18 A I can't. But if we give it a minute, I</p> <p>19 think I will be able to.</p> <p>20 Q Well, if you do remember it at some point</p> <p>21 today, let us know.</p> <p>22 When you had the phone call with</p> <p>23 Ms. Thompson and with Mr. Restaino and this third</p> <p>24 lawyer in the in-person meeting, what did they ask</p> <p>25 you to do?</p>	<p>1 Q (BY MR. ZELLERS) You understood they</p> <p>2 represented the Plaintiffs in this litigation --</p> <p>3 A Yes.</p> <p>4 Q -- is that right?</p> <p>5 A Yes.</p> <p>6 Q You told them that you would be willing to</p> <p>7 do the review. You did not at that point agree to</p> <p>8 serve as an expert witness for the Plaintiffs; is</p> <p>9 that fair?</p> <p>10 A That's fair.</p> <p>11 Q Did you then go and do your review,</p> <p>12 literature review?</p> <p>13 A Yes, I did.</p> <p>14 Q You, at least at that point in time, had</p> <p>15 never previously done any research or review</p> <p>16 relating to talcum powder or relating to any</p> <p>17 potential association between talcum powder,</p> <p>18 perineal talcum powder use, and ovarian concern; is</p> <p>19 that right?</p> <p>20 A That's correct.</p> <p>21 MS. O'DELL: Object to the form.</p> <p>22 Q (BY MR. ZELLERS) You went out and reviewed</p> <p>23 the literature; is that right?</p> <p>24 A Yes.</p> <p>25 Q Did plaintiff's counsel, the two lawyers</p>
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<p>1 A They asked me if I would be willing to do</p> <p>2 a comprehensive and unbiased review of the</p> <p>3 literature around talcum powder products and ovarian</p> <p>4 cancer.</p> <p>5 Q Did they ask you to do anything else?</p> <p>6 A Well, they asked if I would be willing to</p> <p>7 be an expert witness in this case.</p> <p>8 Q Anything else?</p> <p>9 A Nothing else that I can recall.</p> <p>10 Q You said you would do a review of the</p> <p>11 literature, correct?</p> <p>12 A I -- yes --</p> <p>13 Q You --</p> <p>14 A -- I did.</p> <p>15 Q -- you said that you would be willing to</p> <p>16 serve as an expert for Plaintiffs, correct?</p> <p>17 MS. O'DELL: Object to the form.</p> <p>18 A I -- I hesitated on the last question</p> <p>19 because I was very upfront and clear that I was</p> <p>20 willing to do a review, but that I did not know this</p> <p>21 field in any great depth and that I would only be</p> <p>22 interested in doing that if I was permitted to do</p> <p>23 the review the same as I do in my other scientific</p> <p>24 work and that I didn't know if my conclusion would</p> <p>25 support my becoming an expert on their behalf.</p>	<p>1 that you met -- well, strike that.</p> <p>2 The three lawyers you met with, did they</p> <p>3 provide you with some articles to get started with?</p> <p>4 A They provided access to a database, a</p> <p>5 Dropbox, where they had a large number of articles</p> <p>6 that they made available to me.</p> <p>7 Q You reviewed those articles. Did you then</p> <p>8 have another meeting or communication with the</p> <p>9 plaintiffs' lawyers?</p> <p>10 MS. O'DELL: Object to the form.</p> <p>11 A I had several meetings with the lawyers</p> <p>12 over the subsequent year.</p> <p>13 Q (BY MR. ZELLERS) Eventually were you</p> <p>14 asked, you know, to render an opinion on a topic or</p> <p>15 topics?</p> <p>16 MS. O'DELL: Object to the form.</p> <p>17 A I -- I was asked to draft a report of my</p> <p>18 review of the -- the literature and the data that</p> <p>19 were available.</p> <p>20 Q (BY MR. ZELLERS) At this time were there</p> <p>21 any new lawyers that you were meeting with on the</p> <p>22 plaintiffs' side or was it still the three original</p> <p>23 lawyers?</p> <p>24 A They were -- I -- I believe those would</p> <p>25 be -- I think there was one additional lawyer</p>

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<p style="text-align: right;">Page 50</p> <p>1 that --</p> <p>2 Q Do you remember his or her name?</p> <p>3 A Her name. Breanne was her first name.</p> <p>4 Q Do you know Breanne's last name?</p> <p>5 A Maybe Cope or something that's similar to</p> <p>6 Cope.</p> <p>7 Q You reviewed the articles. You were asked</p> <p>8 then by Plaintiffs to write up something relating to</p> <p>9 the articles; is that right?</p> <p>10 A Yes.</p> <p>11 MS. O'DELL: Object to the form.</p> <p>12 Q (BY MR. ZELLERS) At some point did either</p> <p>13 you suggest or the plaintiff lawyers ask you to form</p> <p>14 certain opinions relating to this matter?</p> <p>15 MS. O'DELL: Object to the form.</p> <p>16 A I'm not -- I'm not sure what you mean,</p> <p>17 "form opinions."</p> <p>18 Q (BY MR. ZELLERS) You met with the lawyers;</p> <p>19 is that right, after you had done your literature</p> <p>20 review?</p> <p>21 A Yes.</p> <p>22 Q You had not yet agreed to be an expert</p> <p>23 witness for the Plaintiffs; is that right?</p> <p>24 A Yes.</p> <p>25 Q After you had done your literature review,</p>	<p style="text-align: right;">Page 52</p> <p>1 better than what you have already done?</p> <p>2 A No.</p> <p>3 Q As part of serving as an expert for</p> <p>4 Plaintiffs, you did an -- either A -- do you call it</p> <p>5 a systematic review or a meta-analysis? What do you</p> <p>6 call that?</p> <p>7 A I call it a systematic review.</p> <p>8 Q What's the difference between a systematic</p> <p>9 review and a meta-analysis?</p> <p>10 A I -- I don't think there's any difference.</p> <p>11 They're -- they're both trying to describe an</p> <p>12 unbiased, quantitative review of the medical</p> <p>13 literature.</p> <p>14 Q Did -- your systematic review that you</p> <p>15 did, you did that after you had done this review of</p> <p>16 the literature, fair?</p> <p>17 MS. O'DELL: Object to the form.</p> <p>18 A My systematic review grew out of my</p> <p>19 reading the literature and realizing that there was</p> <p>20 a real gap, which I thought needed to be filled.</p> <p>21 And I chose to do that.</p> <p>22 Q (BY MR. ZELLERS) I will today, you know,</p> <p>23 ask you some more detailed questions about that.</p> <p>24 Let me make sure I have covered by basics here.</p> <p>25 Your report includes as attachments, a</p>
<p style="text-align: right;">Page 51</p> <p>1 did the plaintiffs' lawyer say: Well,</p> <p>2 Dr. Smith-Bindman, do you have an opinion as to</p> <p>3 whether or not there's an association between</p> <p>4 perineal talcum powder use and ovarian cancer?</p> <p>5 A I don't remember any such conversation.</p> <p>6 I -- I think from the very beginning the lawyers</p> <p>7 were guessing that I was going to feel strongly that</p> <p>8 there's a strong association. So I don't remember</p> <p>9 being retained as an expert after my report came</p> <p>10 out.</p> <p>11 At -- at some point I think it became</p> <p>12 clear to them when I explained my views that they</p> <p>13 would like to have me be an expert.</p> <p>14 But I don't remember a particular</p> <p>15 conversation where they asked me to -- where they</p> <p>16 linked my being an expert to the finished product of</p> <p>17 the report. By the time I drafted the report, they</p> <p>18 knew that they had wanted me to be an expert in this</p> <p>19 case.</p> <p>20 Q All right. At -- at some point after you</p> <p>21 had reviewed the literature and you sat and you</p> <p>22 talked with plaintiffs' counsel, you became an</p> <p>23 expert witness for the Plaintiffs; is that right?</p> <p>24 A Yes.</p> <p>25 Q Are you able to time that for us any</p>	<p style="text-align: right;">Page 53</p> <p>1 list of references; is that right?</p> <p>2 A Yes, it does.</p> <p>3 Q What is meant to be included in the</p> <p>4 references that appear and are attached to your</p> <p>5 report, pages 42 through 47?</p> <p>6 A Those are references that I have cited</p> <p>7 specifically in my report.</p> <p>8 Q In addition along with your report, you</p> <p>9 provided a curriculum vitae; is that right?</p> <p>10 A Yes.</p> <p>11 Q We'll mark that as Exhibit 14.</p> <p>12 (Exhibit 14 was marked for identification</p> <p>13 and is attached to the transcript.)</p> <p>14 MS. O'DELL: Thank you.</p> <p>15 Q (BY MR. ZELLERS) The curriculum vitae that</p> <p>16 is attached as -- strike that -- that you provided</p> <p>17 with your report and that we have marked as</p> <p>18 Exhibit 14, is that complete and up to date?</p> <p>19 A Yes, it is.</p> <p>20 Q Any additions or corrections that need to</p> <p>21 be made to that?</p> <p>22 A There are some details of recent</p> <p>23 publications that are not provided in this, but</p> <p>24 those are relatively minor changes.</p> <p>25 Q Are any of -- the details to publications</p>

14 (Pages 50 to 53)

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<p>1 that you would update your curriculum vitae to, do 2 any of those relate to this matter or to the 3 opinions you're giving here today? 4 A They do not. 5 Q Deposition Exhibit 15 is also a document 6 that was provided along with your report. It 7 appears to be a reliance list; is that right? 8 MS. O'DELL: Object to the form. Thank 9 you. 10 (Exhibit 15 was marked for identification 11 and is attached to the transcript.) 12 A Yes, it is. 13 Q (BY MR. ZELLERS) What is included on the 14 reliance list which we have marked as a Exhibit 14? 15 A This is a broad list of -- 16 THE COURT REPORTER: 15. 17 Q (BY MR. ZELLERS) Oh, I'm sorry. Yes let 18 me ask that question again. 19 What documents are listed and included on 20 the reliance list which we have marked as 21 Exhibit 15? 22 A That is a broader list of documents. It 23 includes documents that I may have read, but I 24 didn't believe needed to be cited. 25 It also includes documents that counsel</p>	<p>1 the report in that manner, but just to clarify. 2 A No, I could not easily go through and pick 3 out which ones were ones that I provided to them or 4 which ones they provided to me. 5 Q (BY MR. ZELLERS) All right. Are you aware 6 -- do you know who Dr. Judith Wolf is? 7 A No, I do not. I know the name, but not 8 the person. 9 Q Are you aware that your reliance list or 10 additional Materials Considered List, what we have 11 marked as Exhibit 15, is identical to the Materials 12 Considered List that was attached to Dr. Wolf's 13 report? 14 A I -- I don't know who Dr. Wolf is, nor do 15 I know her reliance list. 16 Q All right. Exhibit 15 is a reliance list 17 or Materials Considered List that was prepared by 18 counsel for Plaintiffs; is that right? 19 A It was the list provided to me. 20 Q You may have reviewed some of these 21 documents -- or you have reviewed some of these 22 documents, but potentially not all of these 23 documents -- 24 MS. O'DELL: Object to the form. 25 Q (BY MR. ZELLERS) -- fair?</p>
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<p>1 provided to me that -- that may or may not have been 2 closely read. 3 So it includes both articles I know very 4 many, as well as additional documents I may not have 5 as deep of a knowledge of. 6 Q Was -- Deposition Exhibit 15, was that 7 prepared by you or was that prepared by counsel? 8 A That was prepared by counsel. 9 Q Have you reviewed all of the references 10 and materials that are listed out on Deposition 11 Exhibit 15? 12 A I -- I do not know. I would have to go 13 through them one at a time to know if I had reviewed 14 all of them. 15 Q Can you easily tell us which of the 16 materials listed on Exhibit 15, your reliance list, 17 were provided by you and which were provided by 18 counsel? 19 MS. O'DELL: Objection. Objection to 20 form. I think the documents and materials 21 considered -- materials and data considered list. 22 MR. ZELLERS: Well, there's no caption at 23 the top. I have tried to be as descriptive as I can 24 with the witness on it. 25 MS. O'DELL: I think it's referred to in</p>	<p>1 A Yes. 2 Q Looking at your report, Deposition 3 Exhibit 2 -- and let me withdraw that. 4 Have we covered now all of the documents 5 that you have either reviewed and relied upon in 6 preparing your opinions in this matter and your 7 report, which we marked as Exhibit 2, or that were 8 made available to you and you may or may not have 9 looked at them? 10 MS. O'DELL: Object to the form. 11 A Yes. 12 Q (BY MR. ZELLERS) Is your report, 13 Exhibit 2, accurate? 14 A Yes, it is. 15 Q Is your report, Exhibit 2, complete, other 16 than perhaps citing to some of the documents that 17 you reviewed after preparing your report that we 18 identified earlier today? 19 A Yes, it is. 20 Q There were -- withdraw that. 21 You have a fee schedule. You're charging 22 a thousand dollars an hour to review materials and 23 talk with the lawyers in this matter and provide 24 opinions; is that right? 25 A Yes.</p>

15 (Pages 54 to 57)

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<p style="text-align: right;">Page 58</p> <p>1 Q I kind of got sidetracked in terms of 2 asking you about the Plaintiff lawyers that you met 3 with. 4 We had gotten up to your meeting with 5 Ms. Thompson, with Mr. Restaino, with a lawyer 6 perhaps with the first name of Breanne; is that 7 correct? 8 A Yep. 9 Q Have you remembered the fourth lawyer yet? 10 A I -- I have not. Can -- can I call a 11 friend? 12 Q No. No, need to call a friend. 13 What other Plaintiff lawyers have you met 14 with relating to your work as a plaintiff expert for 15 the MDL litigation? 16 A There are no others that I recall. 17 Q We have other lawyers here today. You met 18 them -- 19 A I apologize. 20 Q -- at least in the last day or two? 21 A Yes. 22 Q Well, don't apologize to me. You probably 23 hurt their feelings. 24 Did you meet all of the lawyers who are 25 here today at some point?</p>	<p style="text-align: right;">Page 60</p> <p>1 most of the day yesterday, did you have any other 2 meetings or conversations with the lawyers for the 3 Plaintiffs to prepare for your deposition? 4 A Yes, I did. So today is Thursday. 5 Wednesday, we met for most of the day. And I met 6 with Dr. Thompson for an hour or so on Wednesday as 7 well. 8 Q All right. Any other -- 9 MS. O'DELL: I think the days may be mixed 10 up. You said "Wednesday" twice. 11 A I apologize. So Tuesday, we met at the 12 end of the day for an hour and then most of the day 13 yesterday, Wednesday, and then today. Thank you. 14 Q (BY MR. ZELLERS) Any other meetings or 15 communications with counsel for Plaintiffs to 16 prepare for the deposition here today? 17 A Any other in-person meetings or -- 18 Q Or phone calls in which there was, you 19 know, discussion about preparing for the deposition. 20 A I believe over -- well, I had asked to 21 reschedule this deposition. So there were a couple 22 of e-mails related to that. 23 I also had asked for a couple of 24 additional documents to help ensure that I was 25 seeing all materials that I felt were relevant to</p>
<p style="text-align: right;">Page 59</p> <p>1 A Yes, I did. 2 Q Some of them you have met just in the last 3 couple of days as you prepared for the deposition; 4 is that right? 5 A That's correct. 6 Q Other than the lawyers who are present in 7 the room today for Plaintiffs, have you met with any 8 other lawyers or communicated with any other lawyers 9 that you believe represent the Plaintiffs in this 10 litigation? 11 A I have not. 12 Q What did you do to prepare for your 13 deposition here today? 14 A My primary preparation was to review my 15 report and to reaccess references that I included in 16 my report to make sure that I was aware of the 17 details or -- or relevant... 18 Q What else did you do to prepare for your 19 deposition here today? 20 A I also met with the lawyers yesterday to 21 review the process of the deposition and so forth. 22 Q How long did you meet with the lawyers 23 yesterday? 24 A We met most of the day yesterday. 25 Q Other than meeting with the lawyers for</p>	<p style="text-align: right;">Page 61</p> <p>1 the case. 2 Q Are those the materials that were on 3 Exhibit 3 that we talked about at the very 4 beginning? 5 A Yes, they are. 6 Q Anything else that you did with the 7 lawyers in terms of preparing for your deposition 8 here today? 9 A No. 10 MS. O'DELL: Dr. Smith-Bindman, feel free 11 to testify regarding meetings, when they happened, 12 phone calls, et cetera, but not the substance of 13 those discussions. 14 A Okay. 15 MS. O'DELL: Thank you. 16 Q (BY MR. ZELLERS) Any others? 17 A None that I can remember. 18 Q Ms. Thompson -- did you know Ms. Thompson 19 before she initially called you and then came and 20 sat down to meet with you? 21 A Initially, you -- 22 Q Yes. 23 A -- mean? No, I did not. 24 Q Had you ever worked with Ms. Thompson on 25 any other litigation?</p>

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<p>1 A No.</p> <p>2 Q Other than the talcum powder litigation</p> <p>3 that we're here deposing you in, have you worked on</p> <p>4 other litigations for either defendants or</p> <p>5 plaintiffs?</p> <p>6 MS. O'DELL: Other than the ones she has</p> <p>7 testified to?</p> <p>8 Q (BY MR. ZELLERS) Well, other than, yes,</p> <p>9 the cases.</p> <p>10 A No, I have not.</p> <p>11 Q You have served as an expert witness in</p> <p>12 other matters in which you did not provide</p> <p>13 deposition testimony; is that right?</p> <p>14 MS. O'DELL: Object to the form.</p> <p>15 A There are a small number of additional</p> <p>16 medical malpractice cases that I was also involved</p> <p>17 with which would have settled before I was asked to</p> <p>18 take a deposition.</p> <p>19 Q (BY MR. ZELLERS) My question is: Have you</p> <p>20 ever testified or consulted with either plaintiffs</p> <p>21 or defense in -- in a product liability litigation</p> <p>22 like this?</p> <p>23 A I have not.</p> <p>24 Q Have you ever provided testimony in a</p> <p>25 matter relating to a consumer product?</p>	<p>1 Q Do the invoices go through the time that</p> <p>2 you prepared your opinions and report as of</p> <p>3 November 15 of 2018?</p> <p>4 A Yes, they will.</p> <p>5 Q All right. Is that where they end?</p> <p>6 A They would also include some hours that I</p> <p>7 have worked reviewing the material since that time.</p> <p>8 Although, I don't believe I have submitted those</p> <p>9 reports -- those invoices, but I certainly can.</p> <p>10 Q So my question is: How much time have you</p> <p>11 spent on this matter since your last invoice? Can</p> <p>12 you estimate that for us?</p> <p>13 A I would guess in the ballpark of 10 hours,</p> <p>14 not including the time I met with the lawyers</p> <p>15 yesterday -- not this week. Excluding the time this</p> <p>16 week.</p> <p>17 Q How much time did you spend this week in</p> <p>18 addition to that 10 hours with the lawyers in</p> <p>19 preparing yourself to provide deposition testimony?</p> <p>20 A In the ballpark of another 10 hours.</p> <p>21 Q Have you been served or been asked to</p> <p>22 serve as an expert witness or consultant in any</p> <p>23 other talcum powder litigation or matters?</p> <p>24 A I have not.</p> <p>25 Q What percent of your professional time do</p>
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<p>1 A I have not.</p> <p>2 Q Have you ever been retained as an expert</p> <p>3 or provided testimony in a matter relating to</p> <p>4 asbestos?</p> <p>5 A I have not.</p> <p>6 Q Mr. Restaino -- had you ever met</p> <p>7 Mr. Restaino before that initial phone call and</p> <p>8 meeting back in mid-2017?</p> <p>9 A I had not.</p> <p>10 Q When I look at your invoices, will they</p> <p>11 generally outline the times that you had meetings</p> <p>12 and communications with Plaintiff lawyers?</p> <p>13 A Yes, they will.</p> <p>14 Q Will they also outline whatever work</p> <p>15 that -- and I don't mean work, but at least dates as</p> <p>16 to when you began your systematic review or</p> <p>17 meta-analysis?</p> <p>18 A The work that I did will be itemized. I'm</p> <p>19 not sure if I break down writing the report versus</p> <p>20 doing the systematic review into separate buckets,</p> <p>21 but it might.</p> <p>22 Q The invoices will start with sometime in</p> <p>23 mid-2017, when you started meeting with the lawyers;</p> <p>24 is that right?</p> <p>25 A Yes.</p>	<p>1 you spend working as a consultant?</p> <p>2 A A small amount. Probably less than</p> <p>3 5 percent.</p> <p>4 Q What percent of your income is from</p> <p>5 consulting on litigation matters?</p> <p>6 MS. O'DELL: For a particular year or time</p> <p>7 period or average, just --</p> <p>8 Q (BY MR. ZELLERS) Well, the last couple of</p> <p>9 years.</p> <p>10 A In the last couple of years, a -- a small</p> <p>11 amount. Probably 5 or 10 percent.</p> <p>12 Q What is the largest percent of your income</p> <p>13 that has related to consulting on litigation</p> <p>14 matters?</p> <p>15 And what I'm asking you to do is to look</p> <p>16 back. And what was the high point in terms of</p> <p>17 income that you received from consulting on</p> <p>18 medical/legal matters?</p> <p>19 A Probably the 10 percent that I cited.</p> <p>20 Q Have you ever attended a convention or a</p> <p>21 meeting with plaintiff lawyers and other plaintiff</p> <p>22 experts?</p> <p>23 A I have not.</p> <p>24 Q Never?</p> <p>25 A A meeting of lawyers?</p>

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<p>1 Q Yes, a meeting of lawyers --</p> <p>2 A Never.</p> <p>3 Q -- and plaintiff experts.</p> <p>4 A Never.</p> <p>5 Q All right. Have you --</p> <p>6 A I didn't know there was such a thing.</p> <p>7 Q Do you know any of the experts that have</p> <p>8 also been retained by the Plaintiffs in this</p> <p>9 litigation?</p> <p>10 A I don't know them personally, but I -- I</p> <p>11 have seen their names. And their names are the</p> <p>12 same -- some of the names are names that are</p> <p>13 familiar to me.</p> <p>14 Q Have you communicated with any of the</p> <p>15 other experts for Plaintiffs?</p> <p>16 A I have not.</p> <p>17 Q Have you reviewed reports from any of the</p> <p>18 experts for Plaintiffs?</p> <p>19 A I have reviewed a handful of them --</p> <p>20 Q What --</p> <p>21 A -- yes.</p> <p>22 Q -- reports of other plaintiff experts have</p> <p>23 you reviewed?</p> <p>24 A I reviewed Dr. Cooke's report. I reviewed</p> <p>25 Mr. Longo's report. I reviewed an ob --</p>	<p>1 Q What others?</p> <p>2 A Mr. Cooke's deposition, I believe.</p> <p>3 Q What others? Did you put in your report,</p> <p>4 the names of other experts that you reviewed their</p> <p>5 deposition testimony of?</p> <p>6 A I -- I -- I'm checking if -- if I have.</p> <p>7 I...</p> <p>8 Q Well, you have a recollection of reviewing</p> <p>9 --</p> <p>10 A -- I -- I don't have a recollection of any</p> <p>11 others that I have looked at.</p> <p>12 Q Do you know who David Kessler is?</p> <p>13 A I do.</p> <p>14 Q How do you know Dr. Kessler?</p> <p>15 A I --</p> <p>16 MS. O'DELL: Object to the form.</p> <p>17 A -- Dr. Kessler is a faculty member at</p> <p>18 UCSF.</p> <p>19 Q (BY MR. ZELLERS) Do you know him</p> <p>20 personally?</p> <p>21 A Not well, but enough to say hello.</p> <p>22 Q Been at meetings with him?</p> <p>23 A I have.</p> <p>24 Q You understand that he's an expert for the</p> <p>25 Plaintiffs?</p>
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<p>1 obstetrician gynecologist report.</p> <p>2 Q Do you remember who?</p> <p>3 A Clarke perhaps or something like Clarke.</p> <p>4 MS. O'DELL: If you need to refer to your</p> <p>5 report or your materials, feel free to do that.</p> <p>6 A Okay. I think Mr. Cralley's (phonetic)</p> <p>7 report.</p> <p>8 Q (BY MR. ZELLERS) Do you know any of those</p> <p>9 experts personally?</p> <p>10 A I do not.</p> <p>11 Q All right. You have never communicated</p> <p>12 with any of those experts; is that right?</p> <p>13 A I have not.</p> <p>14 Q You have just reviewed their reports; is</p> <p>15 that right?</p> <p>16 A That's correct.</p> <p>17 Q Have you reviewed any deposition testimony</p> <p>18 or portions of depositions of plaintiff experts in</p> <p>19 this matter?</p> <p>20 A I have reviewed small pieces of several of</p> <p>21 them.</p> <p>22 Q Okay. What experts have you reviewed a --</p> <p>23 small pieces of their deposition?</p> <p>24 A Dr. Moorman's testimony or deposition, I</p> <p>25 saw some of.</p>	<p>1 A I -- I have been told that.</p> <p>2 Q Have you had any discussions with</p> <p>3 Dr. Kessler at all relating to this matter, the</p> <p>4 talcum powder matter?</p> <p>5 A I have not.</p> <p>6 Q Have you participated in any projects --</p> <p>7 medical/legal projects with Dr. Kessler --</p> <p>8 A I --</p> <p>9 Q -- in the past?</p> <p>10 A -- I have not.</p> <p>11 Q Have you heard of a documentary called</p> <p>12 "The Bleeding Edge"?</p> <p>13 A I have.</p> <p>14 Q Did you participate in the documentary</p> <p>15 called "The Bleeding Edge"?</p> <p>16 A I did.</p> <p>17 Q You understand that Dr. Kessler also</p> <p>18 participated in that; is that right?</p> <p>19 A I -- yes.</p> <p>20 Q That is a documentary related to what?</p> <p>21 A A medical devices, primarily.</p> <p>22 Q Have you served as a consultant or expert</p> <p>23 in medical device matters?</p> <p>24 A I have not.</p> <p>25 Q Pharmaceutical matters?</p>

18 (Pages 66 to 69)

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<p>1 A I have not.</p> <p>2 Q How was it then that you were retained or</p> <p>3 ended up participating in "The Bleeding Edge"</p> <p>4 documentary?</p> <p>5 MS. O'DELL: Object to the form.</p> <p>6 A I -- I'm not sure if you have had a chance</p> <p>7 to see the documentary or not, but my role in it</p> <p>8 is -- is pretty off topic.</p> <p>9 And so at an initial incarnation of that</p> <p>10 documentary, they had thought about focusing on an</p> <p>11 issue where I do do research, radiation for medical</p> <p>12 imaging.</p> <p>13 It no longer fits into their new topic,</p> <p>14 but somehow they kept a quote of me in that film.</p> <p>15 Q Did -- Dr. Kessler, was he the one</p> <p>16 responsible for putting that documentary together?</p> <p>17 A I -- no, I don't -- I don't believe he</p> <p>18 was.</p> <p>19 Q Were you paid for your work in</p> <p>20 participating in that documentary?</p> <p>21 A No I was not.</p> <p>22 Q All right. Jane Hall, she assisted you</p> <p>23 with your systematic review. Is -- is that the</p> <p>24 right way you would characterize it, a systematic</p> <p>25 review?</p>	<p>1 A I had --</p> <p>2 Q -- in this case --</p> <p>3 A -- not.</p> <p>4 Q -- is that right?</p> <p>5 A That's correct.</p> <p>6 Q Have you worked with other</p> <p>7 biostatisticians in the past?</p> <p>8 A I have.</p> <p>9 Q Why did you decide you needed to work with</p> <p>10 a new biostatistician for this litigation?</p> <p>11 A The primary work that I needed was to do a</p> <p>12 few graphs and figures, and so I wanted someone who</p> <p>13 was both an expert in that and who I thought could</p> <p>14 respond relatively quickly.</p> <p>15 I have on my team, several</p> <p>16 biostatisticians who are part of my research group,</p> <p>17 but they don't have particularly relevant expertise</p> <p>18 in generating these graphs.</p> <p>19 And it would have required them to acquire</p> <p>20 some skills, and so I wanted someone who focuses</p> <p>21 specifically on this who could do that.</p> <p>22 Q Did you review any work from Dr. Hall</p> <p>23 before you hired her?</p> <p>24 A I have been involved in systematic reviews</p> <p>25 that she contributed to that I was very impressed</p>
Page 71	Page 73
<p>1 A Yes, the systematic review -- you asked</p> <p>2 the difference between a meta-analysis. It sort of</p> <p>3 implies a certain scientific review -- rigor when</p> <p>4 you call it a systematic review, so that's how I</p> <p>5 like to think about it.</p> <p>6 Q You think systematic review implies more</p> <p>7 scientific rigor than meta-analysis?</p> <p>8 A I think it's a subtle distinction, but</p> <p>9 yes, I do.</p> <p>10 Q Well, you communicated and hired Jane hall</p> <p>11 to assist you; is that right?</p> <p>12 A Yes, I did.</p> <p>13 Q Have you produced all of your</p> <p>14 communications and materials with Jane Hall?</p> <p>15 A I have.</p> <p>16 Q How did you come in contact with Dr. Hall?</p> <p>17 A I work closely with an emergency medicine</p> <p>18 researcher, and I have assisted him in several</p> <p>19 systematic reviews.</p> <p>20 And I knew he had a biostatistician who</p> <p>21 generated the kind of graphics and analysis that I</p> <p>22 wanted. And so I reached out to him, and he</p> <p>23 introduced me to Dr. Hall.</p> <p>24 Q You had never worked with Dr. Hall prior</p> <p>25 to performing your systematic review --</p>	<p>1 with. And so --</p> <p>2 Q So what other --</p> <p>3 A -- I reached out.</p> <p>4 Q -- sorry. I didn't mean to interrupt you.</p> <p>5 What other systematic reviews have you</p> <p>6 been involved with Dr. Hall?</p> <p>7 A Actually, two of them. One of them is on</p> <p>8 a treatment for kidney stones. Ralph Wang is the</p> <p>9 senior author.</p> <p>10 And the second was a systematic review</p> <p>11 around the diagnosis of and treatment for pulmonary</p> <p>12 embolism that also Dr. Wang was the leader on.</p> <p>13 Q Did you ever meet with Dr. Hall with</p> <p>14 respect to this work in person?</p> <p>15 A I never met with her related to anything.</p> <p>16 It was all by electronic communication.</p> <p>17 Q Did you ever talk with her over the phone?</p> <p>18 A Yes. We spoke a few times.</p> <p>19 Q Did you take notes of your conversations</p> <p>20 with Dr. Hall?</p> <p>21 A Not that I recall.</p> <p>22 Q You did have e-mails with Dr. Hall --</p> <p>23 A Yes.</p> <p>24 Q -- is that right?</p> <p>25 A Yes.</p>

19 (Pages 70 to 73)

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<p>1 Q Do you have receipts for the work that 2 Dr. Hall performed for you? 3 MS. O'DELL: Object to the form. 4 A Like an invoice receipt? 5 Q (BY MR. ZELLERS) Yes, an invoice receipt. 6 A No, I do not. 7 Q You ended up paying her rush fees so that 8 she would do the work and the analysis more quickly; 9 is that right? 10 MS. O'DELL: Object to the form. 11 A I -- I remember telling her I didn't mind 12 her rush fee. But -- but all of the invoicing was 13 done directly with counsel. 14 Q (BY MR. ZELLERS) Well, Dr. Hall came to 15 you and said: You know, it's going to take X amount 16 of time to do a thorough analysis? 17 A Yes. 18 Q She did offer to rush the analysis -- 19 A Yes. 20 Q -- when you told her you needed it? 21 A Yes. 22 Q And your recollection is she, you know, 23 did rush the analysis and -- and got it done within 24 a couple of days? 25 MS. O'DELL: Object to the form.</p>	<p>1 time is 11:10 a.m. 2 Q (BY MR. ZELLERS) Dr. Smith-Bindman, I'm 3 handing you Deposition Exhibit 16, which is an 4 e-mail chain. The very first e-mail, meaning the 5 last e-mail at the top of page 1, is Jane Hall -- 6 from Jane Hall, September 24, 2018, at 8:04 a.m. to 7 you. 8 (Exhibit 16 was marked for identification 9 and is attached to the transcript.) 10 Q (BY MR. ZELLERS) Will you take a look at 11 that and tell us if that is a printout of some of 12 your e-mail exchanges with Dr. Hall? 13 A Yes. 14 Q If we go to the very first e-mail in the 15 chain, it appears that you contacted Dr. Hall on 16 Wednesday, September 19, 2018, in the afternoon, 17 3:21 p.m., and told her that you were interested 18 primarily in generating a forest plot with a summary 19 estimate and test for heterogeneity; is that right? 20 A Yes. 21 Q That was your initial contact with 22 Dr. Hall; is that right? 23 A Yes. 24 Q You contacted your referring person, 25 Ralph, on the e-mail; is that right?</p>
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<p>1 A I believe the analysis actually took a 2 couple of weeks. 3 But I was very open to paying her rush 4 fee. I thought her fee was extraordinarily 5 reasonable, and so it just made it easier for me to 6 get it done quickly rather than to delay. 7 Q (BY MR. ZELLERS) You defer to the e-mails 8 and the documents as to the timing of when you 9 requested that she rush the analysis and when she 10 provided it to you; is that right? 11 MS. O'DELL: Object to the form. 12 A I believe my documents would be correct 13 about when I asked for stuff and when it was done, 14 yes. 15 MS. O'DELL: Excuse me, Mike. We have 16 been going about an hour and 20 minutes. Is this a 17 good time to take a quick break? 18 MR. ZELLERS: Absolutely. 19 THE VIDEOGRAPHER: We are off the record. 20 The time is 10:40 a.m. This is the end of Disc 1. 21 (A break was taken from 10:40 a.m. to 22 11:10 a.m.) 23 THE VIDEOGRAPHER: We are back on the 24 record. This marks the beginning of Disc No. 2 in 25 the deposition of Dr. Rebecca Smith-Bindman. The</p>	<p>1 A Yes. 2 Q All right. You told -- the next day you 3 had some exchanges of e-mails with Dr. Hall. You 4 told Dr. Hall that because you were doing a review 5 for a legal case, you did not need the detail that 6 you would need for a paper; is that right? 7 MS. O'DELL: Object to the form. 8 A Can you tell me where you're reading? 9 Q (BY MR. ZELLERS) Sure. I'm reading on 10 page 2 of Exhibit 16, the very last e-mail. This is 11 from you on September 20 of 2018. 12 You thanked Dr. Hall for her willingness 13 to help. 14 "As Ralph mentioned, I am doing a review 15 for a legal case and don't need quite the detail I 16 would usually need for a paper." 17 Is that what you told Dr. Hall? 18 A Yes, it is. 19 Q As of -- well, you communicated with 20 Dr. Hall on Friday, September 21st, in the 21 morning. This is the very last e-mail on page 1 of 22 Exhibit 16. 23 You asked her to send you whatever she was 24 doing sooner rather than later because you needed to 25 get your report finished ASAP; is that right?</p>

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<p style="text-align: right;">Page 78</p> <p>1 MS. O'DELL: Object to the form. I think 2 you misstated date on the e-mail but -- 3 Q (BY MR. ZELLERS) Well, I'm sorry. Let me 4 ask that question again. On Friday morning, 5 September 21, 2018, you told Dr. Hall that you 6 needed her information as soon as possible because 7 you had to finish your report ASAP; is that right? 8 A Yes. 9 Q Dr. Hall got back to you that day and 10 said, you know, I'll do my best. But if you want, I 11 can rush the work, if you're willing to pay time and 12 a half. 13 You then got back to her on Monday 14 morning, September 24, and said: Yes, I'll pay the 15 rush fee, and I would like your work as soon as 16 possible. 17 Is that right? 18 MS. O'DELL: Object to the form. Object 19 to the form. 20 A I -- I think you're paraphrasing what it 21 says. The -- the idea was she said that if I paid 22 the rush, she could have some money to defray 23 childcare cost during -- 24 Q (BY MR. ZELLERS) Right. And -- 25 A -- that time, and I agreed to do that.</p>	<p style="text-align: right;">Page 80</p> <p>1 A Yes. 2 Q Have you communicated about this 3 litigation with anyone other than the plaintiffs' 4 counsel that you have told us about with Dr. Hall? 5 Anyone else? 6 MS. O'DELL: Object to the form. 7 A I -- you asked me if I have mentioned this 8 litigation to anyone else? 9 Q (BY MR. ZELLERS) Well, let's start there. 10 Have you mentioned this litigation to anyone else? 11 A I have. 12 Q Who have you mentioned this litigation to? 13 A I have certainly mentioned it to my 14 husband. 15 Q Other than your husband? 16 A And then I have mentioned it to several 17 close friends. 18 Q Your husband is a physician; is that 19 right? 20 A He is. 21 Q Did he provide any professional input to 22 you related to your review of this matter? 23 A No, he did not. 24 Q The close friends that you mentioned this 25 to, did they provide any input or assistance or</p>
<p style="text-align: right;">Page 79</p> <p>1 Q Exactly. And she said back to you: Okay. 2 By the end of -- so this is on a Monday. She said 3 you'll have the work product from her Wednesday at 4 the earliest, probably Thursday. 5 "I should have at least two sets of plots 6 today, and I'll send them to you as they are 7 output." 8 Is that right? 9 A Yes. 10 Q You have produced all of your e-mails and 11 communications with Dr. Hall in this matter; is that 12 right? 13 A I have. You're not showing me all of 14 those communications; is that right? 15 Q I haven't yet. 16 A Okay. 17 Q I'm going to show you some more. 18 A Yes. 19 Q But my question to you is: Included in 20 the production, at least you have included all of 21 your communications -- 22 A Yes. 23 Q -- with Dr. Hall -- 24 A Yes. 25 Q -- is that right?</p>	<p style="text-align: right;">Page 81</p> <p>1 direction to you relating to this matter? 2 A No. 3 Q I asked you before if you read any of the 4 depositions of the plaintiff experts. Have you 5 discussed generally with plaintiffs' counsel, the 6 deposition testimony that's been given by other 7 plaintiff experts in this litigation? 8 MS. O'DELL: I would instruct you not to 9 answer that question. 10 MR. ZELLERS: I disagree, but we'll 11 reserve that issue. 12 Q (BY MR. ZELLERS) Was there anything that 13 you asked plaintiffs' counsel to provide to you in 14 connection with your review or for preparation of 15 your report that you were not provided with? 16 A So most of the documents that I included 17 in my report, I found by doing an independent search 18 online. 19 There were several items that I didn't 20 find that I wanted to review as well. And so some 21 of the items that I asked counsel for were items 22 that I couldn't find through scientific research 23 that I asked them to provide. 24 Q And you have told us about those 25 documents, and those are listed out on Exhibit 3; is</p>

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<p>1 that right?</p> <p>2 A That's correct.</p> <p>3 Q My question was a little bit different.</p> <p>4 Is there anything that you asked for from</p> <p>5 plaintiffs' counsel that they were not able or did</p> <p>6 not provide to you?</p> <p>7 MS. O'DELL: Object to the form.</p> <p>8 A I -- I can't think of anything that fits</p> <p>9 into that question.</p> <p>10 Q (BY MR. ZELLERS) Take a look at your</p> <p>11 reliance list, which we have marked as Deposition</p> <p>12 Exhibit 15.</p> <p>13 Do you have that in front of you?</p> <p>14 A I have my copy of the reliance list. I</p> <p>15 don't have your Exhibit 15 in front of me.</p> <p>16 Q If you have your copy -- does it start</p> <p>17 with page 1?</p> <p>18 A Yes, it does.</p> <p>19 Q At the very top --</p> <p>20 A Yes.</p> <p>21 Q -- the first item is "A Survey of The</p> <p>22 Long-Term Effects"?</p> <p>23 A Yes.</p> <p>24 Q If you turn to pages 11 and 12, there's a</p> <p>25 series of documents that begin with "IMERY'S"</p>	<p>1 MR. ZELLERS: Sure. Exhibit 3 is the list</p> <p>2 you gave me today of -- of the documents that</p> <p>3 Dr. Smith-Bindman reviewed in addition to whatever</p> <p>4 else is marked.</p> <p>5 MS. O'DELL: -- I see. I see.</p> <p>6 MR. ZELLERS: So there's a -- it's a list</p> <p>7 of Bates-stamped documents.</p> <p>8 MS. O'DELL: Yes.</p> <p>9 MR. ZELLERS: There's 10 or 12 Imerys</p> <p>10 documents. There's one J&J Bates-stamped document</p> <p>11 --</p> <p>12 MS. O'DELL: Right.</p> <p>13 MR. ZELLERS: -- and then there's the, I</p> <p>14 think, expert report or --</p> <p>15 MS. O'DELL: Right.</p> <p>16 MR. ZELLERS: -- deposition of Dr. Cooke</p> <p>17 listed?</p> <p>18 MS. O'DELL: Right. Okay. I just object</p> <p>19 to the form of the question. And -- and --</p> <p>20 A Could I --</p> <p>21 MS. O'DELL: -- then --</p> <p>22 A -- see Exhibit 3?</p> <p>23 MS. O'DELL: -- yes. And then I would --</p> <p>24 Counsel, permit me -- there was a question related</p> <p>25 to Exhibit 3. I thought you were referring to the</p>
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<p>1 followed by numbers.</p> <p>2 Do you see that?</p> <p>3 A I do.</p> <p>4 Q Do you know whether or not you reviewed</p> <p>5 some or all of those Imerys-produced documents as</p> <p>6 part of your review in this matter?</p> <p>7 A If those reflect Imerys testing documents</p> <p>8 then yes, I did review at least some of them. I</p> <p>9 can't be sure all of them.</p> <p>10 Q Do you know whether or not these documents</p> <p>11 relate to Imerys testing?</p> <p>12 A I have reviewed at least a half dozen</p> <p>13 Imerys testing documents.</p> <p>14 Q In --</p> <p>15 A I believe that's what these are, but I --</p> <p>16 I'm not sure.</p> <p>17 Q There are a number of Imerys documents</p> <p>18 that are listed on Exhibit 3, which you identified</p> <p>19 as testing documents; is that right?</p> <p>20 A Yes.</p> <p>21 Q Do you know if you reviewed any Imerys</p> <p>22 documents other than the documents that are listed</p> <p>23 out on Exhibit 3?</p> <p>24 MS. O'DELL: Can you just make a --</p> <p>25 Exhibit 3, would you remind --</p>	<p>1 materials list, and so I'm going to assert my</p> <p>2 objection a little bit late.</p> <p>3 MR. ZELLERS: Okay. I just want to move</p> <p>4 forward.</p> <p>5 MS. O'DELL: I know that you do.</p> <p>6 MR. ZELLERS: Yes.</p> <p>7 MS. O'DELL: I just want to be clear.</p> <p>8 Because Exhibit 3 that we provided were additional</p> <p>9 materials that Dr. Smith-Bindman asked for and</p> <p>10 reviewed in addition to the Materials Considered. I</p> <p>11 don't want the record to be unclear. So --</p> <p>12 MR. ZELLERS: Well --</p> <p>13 MS. O'DELL: -- I have noted my objection.</p> <p>14 MR. ZELLERS: -- and the record is clear</p> <p>15 that Dr. Smith-Bindman did not review all of the</p> <p>16 materials listed in the Materials Considered List,</p> <p>17 Exhibit 15. But that testimony will stand as it is.</p> <p>18 My question just is: In addition to the</p> <p>19 documents that I was told about this morning that</p> <p>20 you believe are testing documents, do you know</p> <p>21 whether you reviewed any other Imerys-produced</p> <p>22 documents, and specifically the ones that are</p> <p>23 itemized on pages 11 and 12 of your Materials</p> <p>24 Considered List?</p> <p>25 A I would need to see those documents to</p>

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<p>1 know if I reviewed them. The names are awfully 2 nonspecific.</p> <p>3 Q With respect to the Imerys documents -- or 4 Imerys-produced documents that are identified in 5 Exhibit 15, which is your Materials Considered List, 6 do you know how those were compiled?</p> <p>7 MS. O'DELL: Object to the form.</p> <p>8 A You're asking me where this list came 9 from?</p> <p>10 Q (BY MR. ZELLERS) I think you have told us 11 the list came from plaintiffs' counsel; is that 12 right?</p> <p>13 A Yes.</p> <p>14 Q My question then, I guess, is more 15 precise. Do you know how plaintiffs' counsel 16 compiled this list of Imerys-produced documents or 17 how they selected those documents?</p> <p>18 A I know I had a lot of back and forth in 19 generating this list with actually Breanne at the 20 time. I sent her a lot of documents that I had 21 looked at that I hadn't cited that she added to the 22 list.</p> <p>23 These were ones that she added to the 24 list, and I don't remember what they were.</p> <p>25 Q I'm going to ask my question again. Do</p>	<p>1 litigation -- so when you do your research work or 2 when you do your publishing work -- do you rely on 3 documents that are picked by someone else that may 4 not represent the full body of evidence?</p> <p>5 MS. O'DELL: Object to the form.</p> <p>6 A In my work, I review whatever data are 7 available. And sometimes those data are identified 8 by me and sometimes they have been given to me by 9 other sources to review.</p> <p>10 Q (BY MR. ZELLERS) Is that a -- a yes or a 11 no? And let me withdraw that.</p> <p>12 The documents that we have looked at in 13 your reliance list Materials Considered List that 14 begin with Imerys and begin with J&J, your 15 understanding, those are documents that have been 16 produced by the Defendants in this litigation; is 17 that right?</p> <p>18 A Yes.</p> <p>19 Q Do you know what percentage of the overall 20 documents that have been produced by Johnson & 21 Johnson companies and by Imerys, these documents 22 that are listed in Exhibit 15, represent?</p> <p>23 MS. O'DELL: Object to the form.</p> <p>24 A Are you asking me if the handful of 25 documents from Johnson & Johnson that are in this</p>
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<p>1 you know how -- these documents, the documents that 2 are on pages 11 and 12 of your Materials Considered 3 List that begin with the "Imerys" name, do you know 4 how they were compiled?</p> <p>5 A No.</p> <p>6 Q All right. The same question. If you 7 look on page 13 of your Materials Considered List, 8 there's a series of documents that have J&J and then 9 a number; is that right?</p> <p>10 A Yes.</p> <p>11 Q You, as we sit here, do not know what 12 those documents relate to; is that right?</p> <p>13 A That's correct.</p> <p>14 MS. O'DELL: Object to the form.</p> <p>15 Q (BY MR. ZELLERS) You do not know how this 16 listing of J&J documents was compiled; is that 17 right?</p> <p>18 A That's correct.</p> <p>19 Q These are documents produced by Imerys and 20 by Johnson & Johnson companies as part of this 21 overall list of materials that were available, you 22 know, for you to review; is that right?</p> <p>23 MS. O'DELL: Object to the form.</p> <p>24 A Yes.</p> <p>25 Q (BY MR. ZELLERS) Outside of your work in</p>	<p>1 list reflect all of the documents ever created at 2 Johnson & Johnson or all relevant documents or --</p> <p>3 Q (BY MR. ZELLERS) Do you have any idea?</p> <p>4 A No, no idea.</p> <p>5 Q This is a handful of documents that have 6 been listed out by plaintiffs' counsel for you; is 7 that right?</p> <p>8 A Yes.</p> <p>9 MS. O'DELL: Object to the form.</p> <p>10 A Yes.</p> <p>11 Q (BY MR. ZELLERS) All right. In your 12 report you cite two exhibits from the depositions of 13 several witnesses. There's an exhibit from a 14 deposition of John Hopkins.</p> <p>15 Do you know who John Hopkins is?</p> <p>16 A I know what the document is, but I -- I 17 don't know what -- who John Hopkins is.</p> <p>18 Q Do you know what company he works for?</p> <p>19 A I do not.</p> <p>20 Q Do you know what his position or title is?</p> <p>21 MS. O'DELL: Object to the form.</p> <p>22 Q (BY MR. ZELLERS) You're looking in your 23 materials at the exhibit that you were provided from 24 his deposition; is that right?</p> <p>25 A Yes. I -- I -- I do not --</p>

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<p>1 Q Have --</p> <p>2 A -- see.</p> <p>3 Q -- you read any portion of the deposition</p> <p>4 of John Hopkins?</p> <p>5 A I have not.</p> <p>6 Q Have you reviewed any other exhibits from</p> <p>7 the deposition of John Hopkins?</p> <p>8 A I have not.</p> <p>9 Q Do you know who Julie Pier is?</p> <p>10 A I believe I do.</p> <p>11 Q Who is Julie Pier?</p> <p>12 A I -- I'm just checking. I -- I -- I got a</p> <p>13 few names wrong earlier, so I want to just check</p> <p>14 if --</p> <p>15 Q Well, you're going back now and you are</p> <p>16 looking at your report?</p> <p>17 A Yes.</p> <p>18 Q And you have annotated your report, I</p> <p>19 guess, that you are using here today; is that right?</p> <p>20 A Yes.</p> <p>21 Q Why don't we -- just so we have a complete</p> <p>22 record, we'll mark your annotated report as</p> <p>23 Exhibit 17.</p> <p>24 A Yes.</p> <p>25 (Exhibit 17 was marked for identification</p>	<p>1 Q All right. You were provided -- just as</p> <p>2 you were for the exhibit from the deposition of John</p> <p>3 Hopkins, you were provided with the exhibit that you</p> <p>4 are reviewing from Julie Pier's deposition; is that</p> <p>5 right?</p> <p>6 MS. O'DELL: Object to the form.</p> <p>7 A No, I don't -- well, I -- I don't believe</p> <p>8 that's why I know who she is.</p> <p>9 I -- I believe The New York Times story</p> <p>10 and the Reuters story discussed her deposition. So</p> <p>11 I don't remember reading her deposition. But I --</p> <p>12 if I'm not confusing her with someone else, I think</p> <p>13 that's where I learned about her testing.</p> <p>14 Q (BY MR. ZELLERS) Okay. You're a couple of</p> <p>15 questions ahead of me here. No. 1, the exhibit</p> <p>16 that's in your blue folder from the deposition of</p> <p>17 Julie Pier, that was provided to you for review by</p> <p>18 counsel for Plaintiffs; is that right?</p> <p>19 A Thank you for that reminder. That's the</p> <p>20 Imerys document. Yes. Yes.</p> <p>21 Q I'm going to go back to my question.</p> <p>22 A Yes.</p> <p>23 Q The exhibit from Julie Pier's deposition,</p> <p>24 that was provided to you for review by plaintiffs'</p> <p>25 counsel; is that right?</p>
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<p>1 and is attached to the transcript.)</p> <p>2 A And -- and I would like to clarify based</p> <p>3 on some of my notes. But -- so I think Dr. Hopkins</p> <p>4 oversaw testing for -- for talc products at J&J.</p> <p>5 Q (BY MR. ZELLERS) Is that a note that you</p> <p>6 have on your report?</p> <p>7 A It is.</p> <p>8 Q All right. That's a note that you put on</p> <p>9 your report in preparation for your deposition</p> <p>10 today?</p> <p>11 MS. O'DELL: Object to the form.</p> <p>12 A It's a note I put on my report when I was</p> <p>13 reviewing my report and the documents I'm citing and</p> <p>14 so forth.</p> <p>15 Q (BY MR. ZELLERS) Who is Julie Pier? Do</p> <p>16 you know who she is?</p> <p>17 A I'm -- what I believe -- although, I don't</p> <p>18 see that I made a note of it -- is that she was</p> <p>19 someone who did testing from one of the New York</p> <p>20 hospitals of -- of the talc powder products.</p> <p>21 Q Do you know anything more than that about</p> <p>22 Julie Pier or who she worked for or what her role</p> <p>23 with respect to talcum powder was?</p> <p>24 A Now that I am remembering where I -- I --</p> <p>25 no, I don't really know those things.</p>	<p>1 A Yes.</p> <p>2 MS. O'DELL: Object to the form.</p> <p>3 Q (BY MR. ZELLERS) You have not reviewed the</p> <p>4 deposition transcript of Ms. Pier; is that right?</p> <p>5 A Not that I recall.</p> <p>6 Q You have not reviewed any exhibit -- other</p> <p>7 exhibits to her deposition; is that right?</p> <p>8 A That is correct.</p> <p>9 Q Are you aware that the two exhibits that</p> <p>10 you were provided by counsel for Plaintiffs -- one</p> <p>11 from the deposition of John Hopkins and one from the</p> <p>12 deposition of Julie Pier -- that those exhibits were</p> <p>13 prepared by plaintiffs' experts for this litigation?</p> <p>14 MS. O'DELL: Object to the form. I think</p> <p>15 you referred to plaintiffs' experts. I think you</p> <p>16 misspoke. You said they were prepared by</p> <p>17 plaintiffs' experts.</p> <p>18 MR. ZELLERS: Well -- and I will ask it</p> <p>19 again then.</p> <p>20 Q (BY MR. ZELLERS) Are you aware that the</p> <p>21 exhibits that were provided to you -- one from</p> <p>22 Ms. Pier's deposition and one from the Hopkins</p> <p>23 deposition -- are exhibits that were prepared by</p> <p>24 Plaintiffs in this litigation?</p> <p>25 MS. O'DELL: Object to the form.</p>

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<p>1 A I was provided these documents from a 2 prior case. I don't know who prepared them or where 3 they came from. I -- they were provided to me by 4 counsel. 5 Q (BY MR. ZELLERS) Let me ask you just a 6 couple of background questions from your review of 7 the literature in this case. You have reviewed a 8 lot of literature relating to talcum powder and 9 talcum powder use by women in the perineal region; 10 is that right? 11 A Yes, I have. 12 Q I think you say in your report that you 13 reviewed upwards of 40 studies in papers relating to 14 that. Does that sound about right? 15 MS. O'DELL: Object to the form. 16 A Upward of 40 studies that provided primary 17 new data. There were probably hundreds of papers I 18 reviewed on the topic. 19 Q (BY MR. ZELLERS) From that review, do you 20 agree that most women who use talcum powder in their 21 perineal region begin that use before age 30? 22 A I don't know the -- when -- I -- I think a 23 lot of women start use when they're young. I would 24 have to check my report if I have cites as to when 25 they began using talcum powder products.</p>	<p>1 Q And if we looked at the data for when and 2 the age that women were when they first used genital 3 powder, at least from this study by Dr. Cramer, it 4 appears that the vast majority of women began using 5 talcum powder in their genital area before age 30; 6 is that right? 7 A In this publication. 8 Q Do you recall any other publications 9 that -- that you reviewed that provided contrary 10 information? 11 A The question you're asking me is not one 12 that I spent a lot of time thinking about and so 13 can't recall -- sort of across the hundreds of 14 papers I read and 50 that talked about the 15 association -- what time the age of first use was. 16 I -- I see Dr. Cramer's experience is that 17 women do report beginning use earlier, but I -- 18 there's no way for me to know if that's a reflection 19 of his sampling, the place he studied the women, and 20 so forth. 21 Q At least on that point, you would refer to 22 Dr. Cramer, fair? 23 MS. O'DELL: Object to the form. 24 A I -- I would defer to a comprehensive 25 review of the literature to come up with that view.</p>
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<p>1 Q (BY MR. ZELLERS) Well, take a look, if you 2 will, at Deposition Exhibit 18, which is a report by 3 Cramer. 4 (Exhibit 18 was marked for identification 5 and is attached to the transcript.) 6 Q (BY MR. ZELLERS) He's the first named 7 author. This is the 2016 study -- 8 MS. O'DELL: Thank you. 9 Q (BY MR. ZELLERS) -- report. Are you -- 10 MS. O'DELL: Are we at 18? 11 MR. ZELLERS: 18. 12 Q (BY MR. ZELLERS) You're familiar with the 13 paper we have marked as Deposition Exhibit 18; is 14 that right? 15 A Yes, I am. 16 Q I do want to ask you questions a later 17 about that. But for purposes of this question when 18 do most women who use talcum powder -- powder in 19 their perineal region begin, go to page 336 of 20 Exhibit 18 and specifically Table 1. 21 A Yes. 22 Q One of the categories that is reported 23 here in Table 1 is "Age First Used Genital Powder"; 24 is that right? 25 A Yes.</p>	<p>1 My -- my guess would be that Dr. Cramer 2 believes his numbers in his population, but I -- but 3 I don't know that that's the truth in other 4 populations. 5 Q (BY MR. ZELLERS) Well, let me ask you 6 another question. On average from the studies that 7 you reviewed, do women who use talcum powder in 8 their perineal region continue that use for over 9 20 years? 10 MS. O'DELL: Object to the form. 11 A My recollection of the literature is that 12 most publications could not assess or did not ask in 13 detailed enough form of how long women used it. 14 I -- I -- again, it's possibly a question 15 that could be answered from the literature, but I 16 don't recall knowing that answer from my review of 17 the literature. 18 Q (BY MR. ZELLERS) Did you review the Wu 19 2015 paper? 20 A I did. 21 Q Do you have that in one of your notebooks? 22 A I will have it in here. 23 Q That makes it easy. 24 A 2009 or -- 25 Q '15. No. The 2015 Wu paper.</p>

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<p>1 A Yes, I do.</p> <p>2 Q Turn to page 1097, Table 2.</p> <p>3 A Could you -- unfortunately, the page --</p> <p>4 the version I have is a free download, and it</p> <p>5 doesn't have the same page --</p> <p>6 Q How --</p> <p>7 A -- numbers.</p> <p>8 Q -- about -- can you find Table 2? It's</p> <p>9 the a table that's captioned "Prevalence of Risk</p> <p>10 Factors in Non-Hispanic white, Hispanic, and</p> <p>11 African-American Control."</p> <p>12 A Yes, I have that paper.</p> <p>13 Q All right. So if you look at the</p> <p>14 controls, at the very bottom of that section, it</p> <p>15 gives a mean number of years of talc use among</p> <p>16 users; is that right?</p> <p>17 A Yes.</p> <p>18 Q And whether we're looking at non-Hispanic</p> <p>19 whites, Hispanics, or African-Americans, at least</p> <p>20 the number of years of talc use that's reported is</p> <p>21 greater than 20 years for each of those groups; is</p> <p>22 that right?</p> <p>23 A In --</p> <p>24 MS. O'DELL: Object to the form.</p> <p>25 A -- in Dr. Wu's paper, there is reported</p>	<p>1 A Yes.</p> <p>2 Q (BY MR. ZELLERS) Are you able to tell us</p> <p>3 how far before you prepared your report, November 15</p> <p>4 of 2018, that you formed those conclusions?</p> <p>5 MS. O'DELL: Object to the form.</p> <p>6 A I spent considerable hours during 2018</p> <p>7 reviewing the literature. And over the course of</p> <p>8 that year, my opinions started to solidify when I</p> <p>9 saw the evidence that strongly supported that</p> <p>10 ovarian cancer is caused by talcum powder products.</p> <p>11 I --</p> <p>12 Q (BY MR. ZELLERS) And --</p> <p>13 A -- I -- I believe that my final systematic</p> <p>14 review was for me important to -- to confirm that</p> <p>15 association. And that wasn't done -- that wasn't</p> <p>16 completed until my report was basically -- close to</p> <p>17 when my report had to be drafted.</p> <p>18 Q The systematic review that you did was in</p> <p>19 and around September and October of 2018; is that</p> <p>20 right?</p> <p>21 A I believe the final statistical analysis</p> <p>22 was then, but my -- my systematic review went on for</p> <p>23 many months.</p> <p>24 Q Well, your systematic review, at least</p> <p>25 insofar as Dr. Hall assisted you, was in September</p>
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<p>1 that the mean number of years is greater than 20.</p> <p>2 Q (BY MR. ZELLERS) If we look down at the</p> <p>3 group below, the number of cases, the mean number of</p> <p>4 years of talc use among users is greater than</p> <p>5 20 years, also for each of those groups; is that</p> <p>6 right?</p> <p>7 MS. O'DELL: Object to the form.</p> <p>8 A Dr. Wu found that the average number of</p> <p>9 years was greater than 20, yes.</p> <p>10 Q (BY MR. ZELLERS) All right. You have</p> <p>11 never published on, you know, any topic relating to</p> <p>12 talcum powder or any association between talcum</p> <p>13 powder and ovarian cancer; is that right?</p> <p>14 A I have not.</p> <p>15 Q Your opinion is that women exposed to</p> <p>16 perineal talcum powder products on a regular basis</p> <p>17 have about a 50 percent increase in their subsequent</p> <p>18 risk of developing serous invasive cancer; is that</p> <p>19 correct?</p> <p>20 A Yes, that is my opinion.</p> <p>21 Q You also opine in your report that there</p> <p>22 is a causal association between genital talcum</p> <p>23 powder use and ovarian cancer generally; is that</p> <p>24 right?</p> <p>25 MS. O'DELL: Object to the form.</p>	<p>1 of 2018; is that right?</p> <p>2 MS. O'DELL: Object to the form.</p> <p>3 A The systematic review that I described in</p> <p>4 my report has a lot of components. So one component</p> <p>5 is to do a complete comprehensive review of -- of</p> <p>6 what's been published.</p> <p>7 And that involved doing the search,</p> <p>8 according -- obtaining all the papers, and then</p> <p>9 reviewing the bibliography of all of those papers.</p> <p>10 Then reviewing all those papers critically</p> <p>11 and then abstracting data for those papers. Kind of</p> <p>12 towards the tail end of that review is to</p> <p>13 statistically combine the studies.</p> <p>14 Dr. Hall was involved both in abstracting</p> <p>15 the data as a second set of eyes and in doing the</p> <p>16 statistical summary. But I reached out to her after</p> <p>17 all of those initial points were completed. So that</p> <p>18 went on for many months.</p> <p>19 Q (BY MR. ZELLERS) Is it the objective of a</p> <p>20 systematic review to bring clarity to a research</p> <p>21 question by combining like-with-like data?</p> <p>22 MS. O'DELL: Object to the form.</p> <p>23 A The purpose of the systematic review is to</p> <p>24 take individual papers that may not have enough</p> <p>25 statistical power to provide by themselves,</p>

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<p>1 individual results that are meaningful. And if the 2 methodology is combinable, to pool the sample size 3 to get greater statistical power to come up with a 4 conclusion. 5 But your question about combining like 6 with like is -- is -- is very important. 7 Q (BY MR. ZELLERS) In order for research to 8 be useful, it must be valid, correct? 9 A Yes. 10 Q Inaccurate and incomplete reporting of 11 methods can make research unreasonable and unusable; 12 is that right? 13 MS. O'DELL: Object to the form. 14 A I -- I -- I think there are separate 15 phases of research that need happen. I think the 16 reporting of methodology is so that other people can 17 duplicate your results, understand your results. 18 But in and of themselves, the reporting 19 does not influence the reliability of the -- of the 20 research. 21 Q (BY MR. ZELLERS) Is reporting of 22 methodology important? 23 A I -- I think reporting of methodology so 24 that other people can duplicate the results is 25 important.</p>	<p>1 been done, I tried, in writing my report, to 2 highlight the details of what would be needed to 3 understand my result. 4 But I have not, for example, included 5 certain details that you would typically put in a 6 journal article. 7 So in a journal article, you would always 8 publish the version of SAS or R that was used for 9 the report. I -- I would not have included that. 10 And -- and I believe some of the documents 11 I shared with you that Dr. Hall provided to me on 12 the methodology were included in the e-mail to me. 13 And I may not have included it in the 14 report, thinking that the reader would not -- you, 15 for example, would be interested in some of those 16 biostatistical nuances. 17 But when I publish it, I would put those 18 in because the readership might care about them. 19 Q You talked, I believe, a minute ago about 20 abstracting data; is that right? 21 A Yes. 22 Q Is data abstraction one of the most 23 important steps in conducting a meta-analysis or a 24 systematic review? 25 Would you agree with that?</p>
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<p>1 So if -- if I move ahead as I'm planning 2 to publish my systematic review, then I would 3 include greater details about the methodology so 4 that other investigators could duplicate my work, 5 should -- should they so choose. 6 Q At least as of now, other scientists or 7 epidemiologists would not be able to reproduce what 8 you have done based upon your report -- 9 MS. O'DELL: Object -- 10 Q (BY MR. ZELLERS) -- correct? 11 MS. O'DELL: -- object to the form. 12 A I am -- I am not sure that that's the 13 case. 14 Q (BY MR. ZELLERS) Do you think that all of 15 the steps that you followed in terms of preparing 16 your systematic review are set forth in your report? 17 MS. O'DELL: Object to the form. 18 A I think the path that I followed in this 19 review and the method that I used is a method that I 20 have used in a number of other published systematic 21 reviews. 22 And so to the degree that people could 23 sort of say: Well, this is what Dr. Smith-Bindman 24 does in a review -- she focuses on stratified 25 results -- these are the methods that have done --</p>	<p>1 A I would agree with that. 2 Q Would you agree that the accuracy of the 3 data abstraction is very important to the validity 4 of the analysis? 5 A I think one of the hallmarks of doing a 6 systematic review is, in fact, to have several 7 people abstract the data points so that you can be 8 assured that there are -- that they're done as 9 accurately as possible, with the understanding of a 10 single data abstraction by a single person can never 11 be perfect. 12 And so the more people that abstract and 13 review, the greater the accuracy of the data. 14 Q Your data abstraction was not perfect, 15 correct? 16 A It was not. 17 MS. O'DELL: Object to the form. 18 Q (BY MR. ZELLERS) The data abstraction that 19 was done by Dr. Hall was not perfect; is that right? 20 MS. O'DELL: Object to the form. 21 A That is correct. 22 Q (BY MR. ZELLERS) If data is misrepresented 23 -- well, strike that. 24 Are you familiar with the 25 term "misrepresentation"?</p>

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<p>1 MS. O'DELL: Object to the form.</p> <p>2 A I -- I will admit I'm not sure what the</p> <p>3 context is you're asking --</p> <p>4 Q (BY MR. ZELLERS) Well --</p> <p>5 A -- about.</p> <p>6 Q -- let me try to put it in another context</p> <p>7 or at least ask a question that may get to what I am</p> <p>8 trying to get to.</p> <p>9 If data is misrepresented from the</p> <p>10 original study, the analysis -- the systematic</p> <p>11 review or the meta-analysis can be comprised,</p> <p>12 correct?</p> <p>13 A Yes, I agree.</p> <p>14 Q Inaccuracy and misrepresentation of data</p> <p>15 are considered violations of generally accepted</p> <p>16 standards of research; is that right?</p> <p>17 MS. O'DELL: Object to the form.</p> <p>18 A Misrepresentation of data suggests to me</p> <p>19 that there's some malicious or devious attempt where</p> <p>20 occasionally there are sometimes simple errors in</p> <p>21 abstraction when you write down the No. 5 and, in</p> <p>22 fact, the number really is .5.</p> <p>23 And often when abstracting data, it's not</p> <p>24 so much an error of writing down 5 or .5, but it's</p> <p>25 choosing which number in that manuscript reflects</p>	<p>1 MS. O'DELL: -- form.</p> <p>2 Q (BY MR. ZELLERS) Go back to my question.</p> <p>3 And -- and with the background that you have given</p> <p>4 and with your qualification, do you agree that</p> <p>5 inaccuracy and misrepresentation are considered</p> <p>6 violations of generally accepted standards of</p> <p>7 research?</p> <p>8 MS. O'DELL: Object to the form. If you</p> <p>9 don't understand the question, you may ask him to</p> <p>10 rephrase it. If --</p> <p>11 A I --</p> <p>12 MS. O'DELL: -- you understand --</p> <p>13 A -- I --</p> <p>14 MS. O'DELL: -- the question, feel free to</p> <p>15 answer it.</p> <p>16 A -- I felt like I had answered the question</p> <p>17 that I understood, so it -- perhaps I'm not</p> <p>18 understanding your question.</p> <p>19 Q (BY MR. ZELLERS) Are you able to answer</p> <p>20 that question?</p> <p>21 A Yes. I think that misrepresentation of</p> <p>22 data is not how I would describe an error in</p> <p>23 abstraction of data or in a difference of opinion</p> <p>24 about what value reflects the data point you were</p> <p>25 looking for. I wouldn't consider that a</p>
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<p>1 what you are really trying to capture and get at.</p> <p>2 So typically there are more than one way</p> <p>3 to abstract data. It's why it's not -- it -- it's</p> <p>4 why it's not simply having multiple people so they</p> <p>5 don't make typos or small extraction mistakes, but</p> <p>6 rather, that they're making similar choices.</p> <p>7 And so misrepresentation, the way you have</p> <p>8 asked it, makes it sound like there's some malicious</p> <p>9 attempt to get it wrong or to -- to manipulate it</p> <p>10 rather than the wrong number was chosen for either a</p> <p>11 simple error or because there was a choice and the</p> <p>12 choice was not made in a way that two people would</p> <p>13 agree. And so...</p> <p>14 Q (BY MR. ZELLERS) There can be differences</p> <p>15 in the way different folks go about doing a research</p> <p>16 project or a meta-analysis or a systematic review;</p> <p>17 is that right?</p> <p>18 A Yes.</p> <p>19 Q In order for someone to reproduce or</p> <p>20 replicate what another epidemiologist or scientist</p> <p>21 has done, they need to see the steps that the</p> <p>22 scientist or epidemiologist followed; is that right?</p> <p>23 A That is --</p> <p>24 MS. O'DELL: Object to the --</p> <p>25 A -- correct.</p>	<p>1 misrepresentation of data.</p> <p>2 Q Understood. Let me ask my question once</p> <p>3 more.</p> <p>4 A Okay.</p> <p>5 Q Misrepresentation of data would be a</p> <p>6 violation of generally accepted standards of</p> <p>7 research, correct?</p> <p>8 A I agree that misrepresentation of data</p> <p>9 would be a violation of research.</p> <p>10 Q A causal analysis cannot be determined</p> <p>11 based on a single piece of evidence, but requires</p> <p>12 consideration of the totality of relevant evidence.</p> <p>13 Do you agree with that?</p> <p>14 A I would say in the field of epidemiology,</p> <p>15 it's unusual to have a single piece of evidence.</p> <p>16 But I think in some circumstances a single piece of</p> <p>17 evidence can establish causality. Not typically in</p> <p>18 epidemiology work.</p> <p>19 Q What do you mean in your report by "causal</p> <p>20 association"?</p> <p>21 A So in my report, I did research as -- sort</p> <p>22 of as I outlined in my Table of Contents of, you</p> <p>23 know, number of different areas.</p> <p>24 Q Okay. And I'm going to ask you about</p> <p>25 those. Right now my question just --</p>

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<p>1 A No.</p> <p>2 Q -- is --</p> <p>3 A I understand. I --</p> <p>4 Q What --</p> <p>5 A -- understand.</p> <p>6 Q -- do you mean when you say "causal</p> <p>7 association"?</p> <p>8 A No. I -- I understand. I -- I apologize.</p> <p>9 I was not getting there quite quickly enough.</p> <p>10 Q That's all right.</p> <p>11 A So I did research on several topics that I</p> <p>12 thought were highly relevant to coming up with a</p> <p>13 causal determination, and I put those different</p> <p>14 pieces of research and expertise together in terms</p> <p>15 of the causality by specifically looking at the</p> <p>16 Bradford Hill criteria.</p> <p>17 Q I -- and I'm going to get to eventually, I</p> <p>18 hope, why you came up with whatever opinion you came</p> <p>19 up with.</p> <p>20 Right now I'm just trying to understand</p> <p>21 what you mean when you use the words "causal</p> <p>22 association."</p> <p>23 MS. O'DELL: Object to the form. Is there</p> <p>24 a specific case in her report that --</p> <p>25 Q (BY MR. ZELLERS) Sure. "Conclusion."</p>	<p>1 Q Is that what you mean by "causal</p> <p>2 association"?</p> <p>3 A Yes, it is.</p> <p>4 Q What are the other causes of ovarian</p> <p>5 cancer?</p> <p>6 A So there's a whole long list of risk</p> <p>7 factors for ovarian cancer.</p> <p>8 Q What is the difference between a risk</p> <p>9 factor and a cause?</p> <p>10 A A risk factor is something that puts you</p> <p>11 at increased risk, increases the probability that</p> <p>12 you will get ovarian cancer. And there are</p> <p>13 innumerable mechanisms and ways that that can go</p> <p>14 about.</p> <p>15 But often -- not entirely, but often, you</p> <p>16 don't think of risk factors as being things that you</p> <p>17 can alter. That's not entirely true.</p> <p>18 There are some risk factors. For example,</p> <p>19 the use of -- well, the -- the most commonly cited</p> <p>20 risk factor for cancer in general is smoking, and</p> <p>21 that's clearly something that can be started or</p> <p>22 ended, that can be changed.</p> <p>23 But often you think of risk factors as</p> <p>24 things that can't be changed. So elevation in age,</p> <p>25 inherited genetics.</p>
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<p>1 Page 41 of the report, In conclusion, substantial</p> <p>2 evidence supports a strong, positive, and causal</p> <p>3 association between ovarian cancer and genital</p> <p>4 exposure to talcum powder products.</p> <p>5 I just want to know what you mean when you</p> <p>6 say "causal association."</p> <p>7 MS. O'DELL: I think she answered your</p> <p>8 question.</p> <p>9 But you may answer him, if you understand</p> <p>10 it.</p> <p>11 A I -- I think that the -- the four</p> <p>12 sentences just above that says that, Summary</p> <p>13 consideration of causality of talc powder products</p> <p>14 and ovarian cancer using the Bradford Hill.</p> <p>15 So I -- I -- I believe, using this</p> <p>16 framework, the Bradford Hill, the components of the</p> <p>17 Bradford Hill demonstrate that ovarian cancer is</p> <p>18 caused by regular talcum powder exposure based on</p> <p>19 the strength of the association, based on the</p> <p>20 consistency, the temporality of -- of the components</p> <p>21 of my analysis.</p> <p>22 Q (BY MR. ZELLERS) Do you believe that</p> <p>23 perineal use of talcum powder by women on a regular</p> <p>24 basis causes ovarian cancer?</p> <p>25 A Yes, I do.</p>	<p>1 So those things lead to ovarian cancer,</p> <p>2 the risk factors that I describe in my report. But</p> <p>3 most of them are not things that you can influence.</p> <p>4 Some of them are, but most of them are not.</p> <p>5 Where talcum powder products -- the use of</p> <p>6 perineal talcum powder products -- products is</p> <p>7 something that can be changed. That -- that is a</p> <p>8 behavior, and so I think that's the distinction that</p> <p>9 I would make.</p> <p>10 Q A risk factor is something that increases</p> <p>11 the potential risk of a disease, but cannot be</p> <p>12 changed, correct?</p> <p>13 MS. O'DELL: Object to the form.</p> <p>14 A I -- I said that it's often something that</p> <p>15 can't be changed. But -- but again, there are risk</p> <p>16 factors that, by convention, we consider risk</p> <p>17 factors, but that are modifiable.</p> <p>18 Q (BY MR. ZELLERS) All right.</p> <p>19 A And I gave smoking as an example.</p> <p>20 Q A cause of a disease is something that can</p> <p>21 be modified; is -- is that correct?</p> <p>22 A It --</p> <p>23 MS. O'DELL: Object to the form.</p> <p>24 A -- again, it is often used that way.</p> <p>25 Q (BY MR. ZELLERS) What makes a factor cross</p>

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<p style="text-align: right;">Page 114</p> <p>1 the line from being a risk factor to being a cause?</p> <p>2 A I -- I think what I was suggesting is it's</p> <p>3 a blurry distinction. I think it's by convention</p> <p>4 things that cannot be modified are typically thought</p> <p>5 as risk factors. Things that can be modified are</p> <p>6 generally thought about as being in the causal</p> <p>7 family -- pathway.</p> <p>8 But there's no distinction that you can</p> <p>9 separate something that increases your risk of</p> <p>10 something versus something that causes it. The --</p> <p>11 the causal pathways could be the exact same causal</p> <p>12 pathways in both situations.</p> <p>13 Q What other causes are there of ovarian</p> <p>14 cancer?</p> <p>15 A So I'm guessing from what I have just said</p> <p>16 that you are asking about causes and risk factors or</p> <p>17 would you like them to be --</p> <p>18 Q Well, do you use "risk factor" and "cause"</p> <p>19 interchangeably or are they different?</p> <p>20 MS. O'DELL: Object to the form; asked and</p> <p>21 answered.</p> <p>22 A I -- I believe that by convention we</p> <p>23 typically describe risk factors that are things that</p> <p>24 cannot be altered.</p> <p>25 But technically there is no difference</p>	<p style="text-align: right;">Page 116</p> <p>1 Smoking is a possible risk factor.</p> <p>2 So all of those are in the category of</p> <p>3 risk factors for ovarian cancer.</p> <p>4 Q My question goes to cause. Based upon</p> <p>5 your review of the literature over the past year,</p> <p>6 what other causes of ovarian cancer have you</p> <p>7 identified, if any?</p> <p>8 MS. O'DELL: Objection to form; asked and</p> <p>9 answered.</p> <p>10 A There are other contributors to ovarian</p> <p>11 cancer like pelvic inflammatory disease, which I</p> <p>12 think was on the list of what I just noted.</p> <p>13 There are no other modifiable factors that</p> <p>14 I would put on the list of things that cause ovarian</p> <p>15 cancer other than exposure to talc powder products.</p> <p>16 Q (BY MR. ZELLERS) Based upon your review of</p> <p>17 the literature in terms of a cause for ovarian</p> <p>18 cancer, the only cause that you have identified is</p> <p>19 the regular perineal use of talcum powder by women,</p> <p>20 correct?</p> <p>21 MS. O'DELL: Object to the form.</p> <p>22 Misstates her testimony.</p> <p>23 A I believe I just said that pelvic</p> <p>24 inflammatory disease increases the risk of ovarian</p> <p>25 cancer.</p>
<p style="text-align: right;">Page 115</p> <p>1 between factors, covariants that influence your</p> <p>2 cancer risk that you can change or not. So I can</p> <p>3 tell you the list of things that fall into those two</p> <p>4 categories.</p> <p>5 Q (BY MR. ZELLERS) All right. What I want</p> <p>6 to know is: Based upon your review and your</p> <p>7 research over the past year or so, other than</p> <p>8 perineal use of talcum powder on a regular basis,</p> <p>9 what other causes of ovarian cancer are there?</p> <p>10 A So in my report on page 11, I write that,</p> <p>11 Numerous risk factors are identified for ovarian</p> <p>12 cancer. Unfortunately, few can be modified by</p> <p>13 therapies or lifestyle changes. Risk factors</p> <p>14 include personal or family history of -- of cancer,</p> <p>15 inherited mutations, BRC1 and BRC2, advanced age,</p> <p>16 white, race, education, endometriosis.</p> <p>17 Other factors that may increase --</p> <p>18 increase ovarian cancer due to estrogen exposure</p> <p>19 include having no pregnancies or advanced age at</p> <p>20 first birth, obesity, post menopausal hormone</p> <p>21 therapy.</p> <p>22 Several factors I list are associated with</p> <p>23 a decreased risk of ovarian cancer such as breast</p> <p>24 feeding or multiple pregnancies, oral</p> <p>25 contraceptions, tubal ligation, or hysterectomy.</p>	<p style="text-align: right;">Page 117</p> <p>1 Q (BY MR. ZELLERS) Is pelvic in --</p> <p>2 MS. O'DELL: Excuse me. I'm sorry. Were</p> <p>3 you finished, Dr. Smith-Bindman? I mean, if you're</p> <p>4 not, you -- you may continue. If so, I apologize --</p> <p>5 A I --</p> <p>6 MS. O'DELL: -- for interrupting you both.</p> <p>7 A -- I was going to add that endometriosis</p> <p>8 has been noted also as a contributor to --</p> <p>9 Q (BY MR. ZELLERS) Is -- are you finished?</p> <p>10 A -- I am.</p> <p>11 Q Okay. Is pelvic inflammatory disease a</p> <p>12 cause of ovarian cancer?</p> <p>13 A I -- I -- you -- you keep asking me the</p> <p>14 same question, and I don't understand the</p> <p>15 distinction that you are asking me to make between</p> <p>16 something that causes cancer and something that's a</p> <p>17 risk factor.</p> <p>18 In both situation -- situations there is a</p> <p>19 probability of getting a disease versus not getting</p> <p>20 a disease. There's no 100 percent association, and</p> <p>21 so most people, as an analogy who smoke cigarettes,</p> <p>22 do not get lung cancer. It's fewer than 15 percent.</p> <p>23 Does smoking cause lung cancer? Yes. Is</p> <p>24 it a risk factor for lung cancer? Yes. Is it a</p> <p>25 single pathway that everyone who smokes, gets lung</p>

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<p>1 cancer? No.</p> <p>2 So I -- you're asking me to make a</p> <p>3 distinction that I don't make in my head, so I'm --</p> <p>4 I'm not sure -- all of the things I suggested as</p> <p>5 risk factors in some women will cause them to have</p> <p>6 cancer.</p> <p>7 Q You are opining in this case that the</p> <p>8 regular perineal use of talcum powder causes ovarian</p> <p>9 cancer, correct?</p> <p>10 A Yes, I am.</p> <p>11 Q My question is: Does pelvic inflammatory</p> <p>12 disease cause ovarian cancer?</p> <p>13 A In some women, pelvic inflammatory disease</p> <p>14 will cause cancer.</p> <p>15 Q You -- you would list a pelvic</p> <p>16 inflammatory disease as a cause of ovarian cancer;</p> <p>17 is that your testimony?</p> <p>18 MS. O'DELL: Objection, asked and</p> <p>19 answered.</p> <p>20 A I would include pelvic inflammatory</p> <p>21 disease with all the other ovarian cancer risk</p> <p>22 factors like BRCA1 and 2 as being one of a large</p> <p>23 number of contributors and risk factors for ovarian</p> <p>24 cancer.</p> <p>25 There -- there is not -- no other</p>	<p>1 Q (BY MR. ZELLERS) Have you done anything to</p> <p>2 advise the health community about your belief that</p> <p>3 there is a causal association between talcum powder</p> <p>4 use and ovarian cancer?</p> <p>5 A I have mentioned to you that I have spoken</p> <p>6 about my review to several individuals, several</p> <p>7 close mentors of mine in leadership roles within the</p> <p>8 healthcare community. So I --</p> <p>9 Q Who?</p> <p>10 A -- not -- not individuals I am willing to</p> <p>11 name.</p> <p>12 Q You won't tell me who you have talked to</p> <p>13 about your belief or your theory that there's a</p> <p>14 causal association between genital talcum powder use</p> <p>15 and ovarian cancer?</p> <p>16 A I would prefer not to share that</p> <p>17 information.</p> <p>18 Q Have you contacted any public health</p> <p>19 authorities such as the FDA or the National Cancer</p> <p>20 Institute?</p> <p>21 A I have not.</p> <p>22 Q Have you written any type of an op-ed or</p> <p>23 other news article on this topic?</p> <p>24 A Not yet. I have not.</p> <p>25 Q You have done that in the past; is that</p>
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<p>1 exposure -- a modifiable exposure that I can think</p> <p>2 of that leads to getting ovarian cancer or causing</p> <p>3 ovarian cancer.</p> <p>4 Q (BY MR. ZELLERS) In -- in your practice as</p> <p>5 a radiologist, you do not evaluate what caused an</p> <p>6 individual patient's ovarian cancer; is that right?</p> <p>7 MS. O'DELL: Object to the form.</p> <p>8 A As a -- a radiologist, I do not.</p> <p>9 Q (BY MR. ZELLERS) You don't diagnose what</p> <p>10 caused any individual patient's ovarian cancer; is</p> <p>11 that right, in your practice -- your medical</p> <p>12 practice.</p> <p>13 MS. O'DELL: Objection, asked and</p> <p>14 answered.</p> <p>15 A I -- I -- I do not. I diagnose ovarian</p> <p>16 cancer. I diagnosis pelvic inflammatory disease.</p> <p>17 But in an individual patient, I wouldn't tell a</p> <p>18 patient why they got ovarian cancer.</p> <p>19 Q (BY MR. ZELLERS) You -- you have not, at</p> <p>20 least as of this time, published on your theory that</p> <p>21 there is a causal association between genital talcum</p> <p>22 powder exposure and ovarian cancer; is that right?</p> <p>23 MS. O'DELL: Object to the form.</p> <p>24 A I have not published on my conclusion that</p> <p>25 talcum powder products causes ovarian cancer.</p>	<p>1 right?</p> <p>2 A Had -- you're asking if I have written</p> <p>3 op-eds on areas I have done research?</p> <p>4 Q Yes.</p> <p>5 A Yes, I have.</p> <p>6 Q Back in 2014, you did an op-ed in The New</p> <p>7 York Times relating to CT scans; is that right?</p> <p>8 A Yes, I did.</p> <p>9 Q All right. You concluded or at least put</p> <p>10 in the op-ed, In 2007, CT scans will cause 29,000</p> <p>11 excess cancer cases and 14,500 excess deaths; is</p> <p>12 that right?</p> <p>13 A I don't have it in front of me. But it</p> <p>14 looks like you do, and so I'm going to guess that</p> <p>15 that's correct.</p> <p>16 Q Well, does that sound right to you?</p> <p>17 A It does sound right.</p> <p>18 Q You put in that editorial or op-ed that in</p> <p>19 your opinion, 3 percent to 5 percent of all future</p> <p>20 cancers may result from exposure to medical imaging</p> <p>21 such as CT scans; is that right?</p> <p>22 MS. O'DELL: And if you have a</p> <p>23 recollection and -- and you -- and your memory</p> <p>24 confirms those -- those facts, please feel free to</p> <p>25 testify to it. If you need to see the op-ed, then</p>

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<p style="text-align: right;">Page 122</p> <p>1 I'm sure counsel would be willing to put it in front 2 of you. 3 A That particular statistic, I don't have to 4 see. I know that static -- 5 Q (BY MR. ZELLERS) All right. 6 A -- so yes. 7 Q You are familiar with the Center for 8 Disease Control, correct? 9 A Yes, I am. 10 Q The CDC or Center for Disease Control is a 11 reputable organization; is that right? 12 MS. O'DELL: Object to the form. 13 A I think they're a very reputable 14 organization. 15 Q (BY MR. ZELLERS) You have served on 16 several committees for the CDC in the past; is that 17 right? 18 A I currently work on several committees 19 with them. 20 Q Do the doctors and scientists in the CDC 21 work hard to protect women's health, based on your 22 experience? 23 A Yes, they do. 24 Q In forming your opinions in this case, did 25 you consider the risk factors that the CDC</p>	<p style="text-align: right;">Page 124</p> <p>1 of many pieces of information I used. 2 Q (BY MR. ZELLERS) Are you aware that in 3 their patient-facing websites, as well as their 4 publicly available information about ovarian cancer, 5 the CDC does not identify perineal use of talcum 6 powder as a risk factor for ovarian cancer? 7 A Yes, I do remember seeing that. 8 Q You don't have any reason to believe that 9 the folks at the CDC have not kept up to date with 10 talc and ovarian cancer epidemiology, do you? 11 MS. O'DELL: Object to the form. 12 A I believe that the comprehensiveness of 13 the review that I did and the amount of time that I 14 put into this review, as I have in -- in many other 15 reviews, requires a very deep dive into the 16 literature. 17 And I do not believe that the CDC has 18 funding or resources to do that kind of deep dive. 19 And so typically what they do is sort of review some 20 things that have been published. Most things, they 21 don't end up reviewing. 22 And so I have no reason to believe anyone 23 at the CDC deliberately didn't do a comprehensive 24 review of the literature, but -- nor do I have any 25 evidence that they did a comprehensive review of the</p>
<p style="text-align: right;">Page 123</p> <p>1 recognizes for ovarian cancer? 2 A From my report, I read an enormous number 3 of articles, and I spent considerably time 4 considering those articles from a data point of 5 view. 6 And I did not, for the most part, weigh 7 other organization's summaries if they were not 8 quantitative and very explicit in what reviews they 9 did, what literature they included. 10 And sometimes they -- organizations did do 11 that, but did not do nearly as -- a comprehensive 12 job. So I -- I would not have relied on any 13 professional organization's reviews unless they were 14 quantitative the way -- the way my own were? 15 MR. ZELLERS: Move to strike as 16 nonresponsive. 17 Q (BY MR. ZELLERS) Let me ask the question 18 again. In forming your opinions in this case, did 19 you consider the risk factors that the CDC 20 recognizing for ovarian cancer? 21 MS. O'DELL: Object to the form. 22 A I saw documents on their websites that 23 list risk factors, and no individual organization's 24 summaries, either for patients or for clinicians, 25 formed a very large piece of my opinion. It was one</p>	<p style="text-align: right;">Page 125</p> <p>1 literature. 2 Q (BY MR. ZELLERS) Do you have any personal 3 knowledge one way or the other as to the extent of 4 the review of the science and literature that the 5 CDC did in compiling its list of risk factors for 6 ovarian cancer? 7 A I -- 8 MS. O'DELL: Object to the form. 9 A -- I would have to refresh my memory by 10 looking at their -- their website and documents. If 11 you provided those, I could. 12 Q (BY MR. ZELLERS) My question is: Do you 13 have any personal knowledge one way or the other as 14 to what the CDC has done with respect to a review of 15 the scientific literature in compiling its list of 16 risk factors for ovarian cancer? 17 A I don't know offhand what they did. And I 18 don't recall when looking at their website, what 19 references they listed. 20 I think if their reference list included a 21 very short -- small number of references, I would 22 have concluded that they had not done a very 23 comprehensive review. 24 Q (BY MR. ZELLERS) My question is: Do you 25 have any personal knowledge as to what the CDC did</p>

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<p>1 or did not do with respect to its review of the 2 literature? 3 A Again, I don't know off the top of my 4 head. But I know I went to their website, and I 5 don't -- 6 Q Other than looking at their website, do 7 you have any personal knowledge? 8 A No, I do not. 9 Q All right. Have you communicated to 10 anyone at the CDC that you disagree with their 11 position? 12 A I -- I'm laughing at the nature of the 13 question. There wouldn't be anyone at the CDC to 14 disagree with. 15 Q There -- there's no one at the CDC that 16 you, as a concerned radiologist, could go to and 17 say: Hey, I think that you should list perineal 18 talc use as a risk factor for ovarian cancer? 19 MS. O'DELL: Object to the form. 20 Q (BY MR. ZELLERS) There's no one you could 21 talk to at the CDC about that? 22 A I -- I would -- I would have to confirm 23 that that -- I have been -- I -- I study 24 environmental carcinogens. 25 And you pointed out my New York Times</p>	<p>1 MS. O'DELL: Object to the form. 2 A Naive to suggest that a single person 3 could just call them and say: I have looked at this 4 topic, and you should change what you are doing. 5 Q (BY MR. ZELLERS) Are you familiar with the 6 National Institute of Health? 7 A I am. 8 Q You have received funding from the 9 National Institute of Health; is that right? 10 A I have. 11 Q Do you know that the National Institute of 12 Health does not list talc use as a risk factor for 13 ovarian cancer? 14 MS. O'DELL: Object to form. 15 A Again, I -- yeah, I know that the NCI, PDQ 16 that writes reports for patients and clinicians 17 about risk factors for cancer has a report on risk 18 factors for ovarian cancer and that they conclude 19 that there's inadequate evidence for talc. 20 Q (BY MR. ZELLERS) Inadequate evidence, 21 correct? 22 A I -- I -- I wasn't finished. 23 Q Please finish. 24 A So they don't stand -- just to clarify, 25 for the National Institute of Health. It's a very</p>
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<p>1 op-ed that put a message out there that said: I 2 think this is an environmental carcinogen. 3 And I have spoken about that topic in many 4 forms. I have testified before Congress several 5 times. I testified to the FDA. I have spoken to 6 CMS. 7 All of that took years to get people to 8 hear those messages. It was not that: Oh, I see 9 there's a problem here. Let me just tell the top 10 person to do that. 11 And -- and so I'm -- you're suggesting 12 there's someone at the CDC that I could call and 13 say: Oh, by the way, I think that's an important 14 topic. I appreciate your giving me that idea. I 15 will move forward once I publish a paper on this 16 topic. 17 But -- but that's not nearly as -- as 18 simple as you're suggesting in your question. 19 There's a naiveness there that there's someone at 20 the CDC who would -- who takes responsibility for 21 what they do and -- on all of their websites and you 22 can sort of give them feedback on that. 23 Q You believe I'm being naive to think that 24 there's a person responsible at the CDC for 25 compiling a list of risk factors for ovarian cancer?</p>	<p>1 prestige body. It's an organization within a small 2 part of the NCI. 3 I know it well, because I served on that 4 committee for many years. I know the process 5 whereby they review the literature and created a 6 whole a bunch of standards within what they do 7 around that. 8 And I looked and saw that they updated 9 their summary of talc in 2018. And -- and yet, 10 within that summary, they do list the references 11 that they cite, and they omit a large number of 12 references that are recent. 13 So I do know their conclusion. I do not 14 agree with their conclusion. And there were large 15 gaps in their literature. And that update was very 16 recent. 17 I -- I told you I don't know the 18 leadership at the CDC, and they don't have a 19 process. But I do know the leadership on this 20 committee and -- and will point out their omissions 21 to this committee. 22 Q Well, I haven't gotten to the National 23 Cancer Institute yet. 24 My question was: Do you know that NIH, 25 the National Institute of Health, does not list use</p>

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<p style="text-align: right;">Page 130</p> <p>1 of talcum powder as a risk factor for ovarian 2 cancer? 3 A So I -- I -- I don't know what -- I'm 4 sorry. I don't know what you're talking about, 5 the -- 6 Q All right. 7 A -- NIH. 8 Q Take a look, if you will, at Deposition 9 Exhibit 19, which is captioned NIH steer -- or 10 "SEER, S E E R, Training Modules" and has got "Risk 11 Factors" at the top. 12 (Exhibit 19 was marked for identification 13 and is attached to the transcript.) 14 MS. O'DELL: Thank you. 15 A So SEER is also a part of National Cancer 16 Institute. It's the surveillance epidemiology -- 17 MR. LAPINSKI: Have her wait for a 18 question. 19 MS. O'DELL: Sorry. Just wait for his 20 question. Yeah, thanks, Dan. 21 Q (BY MR. ZELLERS) You recognize Exhibit 19 22 as a training module from NIH and specifically from 23 the National Cancer Institute; is that right? 24 A So this says at the top "SEER Training 25 Modules."</p>	<p style="text-align: right;">Page 132</p> <p>1 include modifiable and nonmodifiable parameters. 2 Is that right? And then it lists out 3 nonmodifiable parameters and modifiable parameters; 4 is that right? 5 A Yes, that's what this -- 6 Q Talcum -- 7 A -- says. 8 Q -- powder use is not listed, correct? 9 A Correct. 10 Q All right. Take a look, if you will -- 11 and this is the document that you were talking about 12 a moment ago -- at Deposition Exhibit 20. 13 (Exhibit 20 was marked for identification 14 and is attached to the transcript.) 15 Q (BY MR. ZELLERS) This is the "National 16 Cancer Institute Review of Ovarian, Fallopian Tube, 17 and Primary Peritoneal Cancer Prevention PDQ"; is 18 that right? 19 A Yes, it is. 20 Q This is the document that you told us a 21 few minutes ago that you disagree with the 22 conclusion; is that right? 23 And specifically if you go to page 5 of 9 24 under "Perineal Talc Exposure," the statement from 25 the National Cancer Institute in this document is</p>
<p style="text-align: right;">Page 131</p> <p>1 I don't know what this is. I know SEER 2 quite well. It's the National Cancer Registries. 3 But I -- I don't -- don't know what this training 4 module is. But I do see that you are showing me 5 some risk factors. 6 Q Talc is not listed as a risk factor for 7 ovarian cancer in this document, Exhibit 19, that 8 was updated in June of 2018 from NIH and the 9 National Cancer Institute; is that right? 10 A I -- I want to sort of explain my 11 confusion. The SEER, Surveillance, Epidemiology, 12 and End Result, program does not train or educate 13 individuals typically using documents like this. 14 Often this is for cancer abstractors to 15 know what information they're asking their 16 abstractors to collect. 17 I -- I don't know what this is, but it 18 doesn't look to me like something that's identifying 19 risk factors as much as asking medical chart 20 abstractors to write down information that they're 21 collecting as part of their data. 22 Q My question is very simple. This is a 23 list that at the top says "Risk Factors." 24 The introductory statement says, The main 25 risk and protective factors for ovarian cancers</p>	<p style="text-align: right;">Page 133</p> <p>1 that the weight of evidence does not support an 2 association between perineal talc exposure and an 3 increased risk of ovarian cancer. Results from 4 case-control and cohort studies are inconsistent. 5 Is that right? 6 A That is what they conclude. 7 Q This was updated, if you looked at the 8 last page, page 9 of 9, on January 4 of 2019; is 9 that right? 10 MS. O'DELL: Object to the form. 11 A Can you show me where it's been updated? 12 Q (BY MR. ZELLERS) Sure. Look at the very 13 last page. In bold, "Updated January 4, 2019"; is 14 that right? 15 A It does say that -- 16 Q All right. 17 A -- yes. 18 Q Are there limitations on epidemiological 19 data? 20 A Yes, there are. 21 Q Do you agree that epi -- epidemiologic 22 data alone cannot permit a determination regarding 23 causation? 24 A I'm sorry. Can you just -- 25 Q Do you need me to say it again or can you</p>

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<p style="text-align: right;">Page 134</p> <p>1 read it off the screen?</p> <p>2 A I can read it off the screen. I think</p> <p>3 epidemiologic data can provide an enormous amount of</p> <p>4 information about causation. But there are other</p> <p>5 considerations that would have to be also taken into</p> <p>6 account to also support that.</p> <p>7 Q Can epidemiologic data alone permit a</p> <p>8 determination regarding causation?</p> <p>9 MS. O'DELL: Object to the form.</p> <p>10 A I think epidemiologic data can be used in</p> <p>11 combination with other data to determine causality,</p> <p>12 but by itself cannot be used alone to determine</p> <p>13 causality.</p> <p>14 Q (BY MR. ZELLERS) The current epidemiologic</p> <p>15 data, as it exists, does not enable someone to</p> <p>16 distinguish between brands of cosmetic talc</p> <p>17 products; is that right?</p> <p>18 MS. O'DELL: Object to the form.</p> <p>19 A I would agree.</p> <p>20 Q (BY MR. ZELLERS) You can't tell in any of</p> <p>21 the 40 plus studies that you reviewed, that the</p> <p>22 women who were involved in those studies used talc</p> <p>23 products manufactured by Johnson & Johnson</p> <p>24 Consumer, Inc., or by another company; is that</p> <p>25 right?</p>	<p style="text-align: right;">Page 136</p> <p>1 awful lot of Johnson & Johnson baby powder over the</p> <p>2 last 50 plus years. And -- and I am --</p> <p>3 Q (BY MR. ZELLERS) And --</p> <p>4 A -- not sure whether there's lots of other</p> <p>5 dominant players in the space. I -- I don't know</p> <p>6 that.</p> <p>7 My impression is that Johnson -- baby</p> <p>8 powder baby is a Johnson & Johnson a product very,</p> <p>9 very often.</p> <p>10 Q But you have not done any type of survey</p> <p>11 --</p> <p>12 A I have --</p> <p>13 Q -- or analysis?</p> <p>14 A -- I have not.</p> <p>15 Q If the biological mechanism by which a</p> <p>16 talcum powder product can increase the risk of</p> <p>17 ovarian cancer is because of a particular</p> <p>18 contaminant or collection of contaminants, but that</p> <p>19 contaminant or collection of contaminants does not</p> <p>20 exist in all talcum powder products, will the</p> <p>21 epidemiologic evidence that exists today allow you</p> <p>22 to see that distinction?</p> <p>23 MS. O'DELL: Object to the form.</p> <p>24 A You're asking about contaminants of talcum</p> <p>25 powder products. My understanding from what I have</p>
<p style="text-align: right;">Page 135</p> <p>1 MS. O'DELL: Object to the form.</p> <p>2 A I -- I would agree that most of the papers</p> <p>3 that I read did not specify what the source of the</p> <p>4 baby powder was.</p> <p>5 Q (BY MR. ZELLERS) Based on the analysis</p> <p>6 that you have done, you're not able to draw an</p> <p>7 opinion specifically about an increased risk of</p> <p>8 ovarian cancer that is tied to a particular brand of</p> <p>9 talcum powder, correct?</p> <p>10 MS. O'DELL: Object to the form.</p> <p>11 A My impression is that a large proportion</p> <p>12 of the talcum powder products that are available</p> <p>13 happen to be made by Johnson & Johnson, but I do not</p> <p>14 know for any given study -- for most of the studies,</p> <p>15 at least, what kind of talcum powder it was.</p> <p>16 Q (BY MR. ZELLERS) Okay. Is your impression</p> <p>17 that you just shared with us, you know, based on</p> <p>18 information you have received from plaintiffs'</p> <p>19 counsel?</p> <p>20 MS. O'DELL: Object to the form. Don't --</p> <p>21 don't discuss what's been provided by -- let me say</p> <p>22 that again.</p> <p>23 Don't -- don't discuss conversations with</p> <p>24 plaintiffs' counsel. Thank you.</p> <p>25 A I -- my impression is based on seeing an</p>	<p style="text-align: right;">Page 137</p> <p>1 reviewed is that the components of talcum powder</p> <p>2 products include asbestos, include fibrous talc,</p> <p>3 include heavy metals, include fragrances.</p> <p>4 Let's get rid of the header -- the --</p> <p>5 the fragrances. Just the heavy metals, the</p> <p>6 asbestos, and the fibrous talc. My understanding is</p> <p>7 that those are in the same mines as the platy talc,</p> <p>8 which is the desired part of talc.</p> <p>9 To the degree that those are all part and</p> <p>10 parcel of the same product, they're not -- I</p> <p>11 wouldn't think of them as contaminants. I would</p> <p>12 think of them as just part of the product.</p> <p>13 And so to the degree that that product</p> <p>14 cannot be separated, I would be concerned that any</p> <p>15 talcum powder products have all of the above.</p> <p>16 I separated fragrance, because that's</p> <p>17 something that's added. That's not mined directly.</p> <p>18 But the other items, my understanding is that's part</p> <p>19 of the talc.</p> <p>20 Q You don't know one way or the other</p> <p>21 whether talcum powder products contain asbestos, do</p> <p>22 you?</p> <p>23 MS. O'DELL: Object to the form.</p> <p>24 A You're asking me to opine whether talcum</p> <p>25 powder products contain asbestos?</p>

35 (Pages 134 to 137)

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<p>1 Q (BY MR. ZELLERS) Yes.</p> <p>2 A Yes, I -- I feel very certain that talcum</p> <p>3 powder products, at least over many years, contained</p> <p>4 asbestos.</p> <p>5 Q Is that part of your opinion in this case?</p> <p>6 A Yes, it is.</p> <p>7 Q Is it your opinion in this case that</p> <p>8 talcum powder products contain trace amounts of</p> <p>9 heavy metals?</p> <p>10 A Yes, it is.</p> <p>11 Q Is it also part of your opinion in this</p> <p>12 case that talcum powder products contain different</p> <p>13 fragrance chemicals?</p> <p>14 A Yes, it is.</p> <p>15 Q Do you have any opinion as to how many</p> <p>16 fragrance chemicals are contained in talcum powder</p> <p>17 manufactured by a Johnson & Johnson company at any</p> <p>18 time?</p> <p>19 MS. O'DELL: Object to the form. With</p> <p>20 regard to "opinion."</p> <p>21 A I have seen long lists of chemicals and</p> <p>22 fragrances that are contained.</p> <p>23 I'm not familiar enough with -- with the</p> <p>24 testing that was done to understand how that's</p> <p>25 changed over time in a Johnson & Johnson product</p>	<p>1 manufactured by Johnson & Johnson?</p> <p>2 MS. O'DELL: Object to the form. to the</p> <p>3 form.</p> <p>4 A So unlike the question about heavy metals</p> <p>5 where it sort -- there are traces of heavy metals in</p> <p>6 other things to which we're exposed regularly, like</p> <p>7 water. We don't expect any concentrations of</p> <p>8 asbestos in products that we're exposed to.</p> <p>9 And so put in that context, while I'm not</p> <p>10 an expert in the mineralogy, the numbers that I have</p> <p>11 seen are tens of thousands to millions of fibers</p> <p>12 that might be in grams of product seem like an awful</p> <p>13 lot of units or dose of -- of asbestos or fibrous</p> <p>14 talc.</p> <p>15 MR. ZELLERS: Move to strike as</p> <p>16 nonresponsive.</p> <p>17 Q (BY MR. ZELLERS) You do not have personal</p> <p>18 knowledge as to any amounts or concentrations of</p> <p>19 asbestos in talcum powder manufactured by Johnson &</p> <p>20 Johnson --</p> <p>21 MS. O'DELL: Objection.</p> <p>22 Q (BY MR. ZELLERS) -- correct?</p> <p>23 MS. O'DELL: Objection, asked and</p> <p>24 answered.</p> <p>25 A I have seen several reports of Johnson &</p>
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<p>1 versus other talcum powder products.</p> <p>2 Q (BY MR. ZELLERS) Do you have any opinion</p> <p>3 or knowledge as to the amount or concentration of</p> <p>4 particular fragrance chemicals that are contained in</p> <p>5 talcum powder manufactured by Johnson & Johnson?</p> <p>6 A I -- I do not.</p> <p>7 Q Do you have any opinion or knowledge as to</p> <p>8 the amount or concentration of trace chemicals</p> <p>9 -- strike that -- trace heavy metals that may be</p> <p>10 contained in talcum powder manufactured by Johnson &</p> <p>11 Johnson?</p> <p>12 A I have seen reports of the amounts that --</p> <p>13 you know, sort of in the ballpark of hundreds to</p> <p>14 thousands of parts per million.</p> <p>15 But I'm not an expert in understanding</p> <p>16 those numbers in comparison to the concentrations in</p> <p>17 other things that we're exposed to. They're much</p> <p>18 higher. They're orders of magnitudes higher, but</p> <p>19 I'm not an expert to understand how those different</p> <p>20 concentrations might be expected to have an</p> <p>21 influence on talc.</p> <p>22 Q The same question with respect to</p> <p>23 asbestos. Do you have any opinion or knowledge as</p> <p>24 to the amount or concentration of asbestos that you</p> <p>25 believe is contained in any talcum powder</p>	<p>1 Johnson products that have been tested for</p> <p>2 concentrations of asbestos or asbestiform talc that</p> <p>3 have concentrations shown kind of in ranges of a</p> <p>4 tenth of a percent or, as I mentioned, tens of</p> <p>5 thousands or mid -- millions of fibers.</p> <p>6 And those have been tested by -- by</p> <p>7 several different people, but coming up with units</p> <p>8 of dose within Johnson & Johnson talcum powder</p> <p>9 products.</p> <p>10 Q (BY MR. ZELLERS) You're not a geologist,</p> <p>11 correct?</p> <p>12 A I am not a geo --</p> <p>13 Q You're --</p> <p>14 A -- logist.</p> <p>15 Q -- not a mineralogist, correct?</p> <p>16 A I am not.</p> <p>17 Q You have reviewed some expert reports from</p> <p>18 Dr. Longo; is that right?</p> <p>19 A Among others, yes.</p> <p>20 Q You have reviewed some testing reports.</p> <p>21 Some purportedly show that there is asbestos present</p> <p>22 in talcum powder and some that show that there's not</p> <p>23 asbestos in talcum powder; is that right?</p> <p>24 MS. O'DELL: Object to the form.</p> <p>25 A I have seen a lot of reports that have</p>

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<p>1 shown the presence of talcum powder containing</p> <p>2 asbestos and fibrous talc.</p> <p>3 You listed some of those, the Longo</p> <p>4 reports, a bunch of publications in the literature</p> <p>5 such as Blount's.</p> <p>6 I have seen some testing from Dr. Hopkins,</p> <p>7 from Imerys, from Cooke. I have also seen some</p> <p>8 negative reports.</p> <p>9 Q (BY MR. ZELLERS) The answer to my question</p> <p>10 is: Yes, you have seen testing that purportedly</p> <p>11 shows there to be some asbestos in the J&J</p> <p>12 manufactured talcum powder and you have seen reports</p> <p>13 that, you know, indicate there's not asbestos in the</p> <p>14 talcum powder; is that fair?</p> <p>15 A The way that you have described it makes</p> <p>16 it seem like I have seen comprehensive reports that</p> <p>17 have shown in totality there is asbestos and reports</p> <p>18 that have shown there's not. I haven't seen that.</p> <p>19 Q All right.</p> <p>20 A I have seen reports that have shown in</p> <p>21 totality there are. I have seen individual samples</p> <p>22 that have shown there's not asbestos in those</p> <p>23 individual samples.</p> <p>24 But I haven't seen a systematic report</p> <p>25 that have shown in, for example, a large number of</p>	<p>1 off the record for a moment.</p> <p>2 THE VIDEOGRAPHER: We're off the record at</p> <p>3 1:36 p.m.</p> <p>4 (A break was taken from 1:36 p.m. to</p> <p>5 1:37 p.m.)</p> <p>6 THE VIDEOGRAPHER: We are back on the</p> <p>7 record. The time is 1:37 p.m.</p> <p>8 Q (BY MR. ZELLERS) Dr. Smith-Bindman, you</p> <p>9 had recalled, I believe, the name of the fourth</p> <p>10 plaintiff lawyer that you met with?</p> <p>11 A Carmen Scott.</p> <p>12 Q I want to ask you some questions about the</p> <p>13 systematic review that you did. You have not</p> <p>14 published that, correct?</p> <p>15 A I have not.</p> <p>16 Q If at any point you do publish your</p> <p>17 systematic review, would you disclose that you are a</p> <p>18 paid expert for the Plaintiffs in the talcum powder</p> <p>19 litigation?</p> <p>20 A Yes, I would.</p> <p>21 Q You would expect any expert who is paid to</p> <p>22 perform a review or who has a study funded by</p> <p>23 Plaintiffs to make that disclosure, correct?</p> <p>24 MS. O'DELL: Object to the form.</p> <p>25 A My understanding from my experience is</p>
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<p>1 specimens, none had asbestos. I haven't seen that.</p> <p>2 Q You have seen, at least in large part, the</p> <p>3 information that's been provided to you by</p> <p>4 plaintiffs' attorneys; is that right?</p> <p>5 MS. O'DELL: Object to the form. to the</p> <p>6 form.</p> <p>7 A I think some of the public -- published</p> <p>8 literature was not provided by plaintiff attorneys</p> <p>9 and some has been, such as the Longo reports.</p> <p>10 MR. ZELLERS: All right.</p> <p>11 MS. O'DELL: Mike, we have been going</p> <p>12 about an hour and 30 minutes. And our lunch is</p> <p>13 here, so is this a good time.</p> <p>14 MR. ZELLERS: Sure --</p> <p>15 MS. O'DELL: -- for a break?</p> <p>16 MR. ZELLERS: -- of course.</p> <p>17 THE VIDEOGRAPHER: This marks the end of</p> <p>18 Disc 2. We are off the record at 12:37 p.m.</p> <p>19 (A break was taken from 12:37 p.m. to</p> <p>20 1:36 p.m.)</p> <p>21 THE VIDEOGRAPHER: We are back on the</p> <p>22 record. This marks the beginning of Disc No. 3 in</p> <p>23 the deposition of Dr. Rebecca Smith-Bindman. The</p> <p>24 time is 1:36 p.m.</p> <p>25 MR. ZELLERS: Dr. Smith-Bindman, let's go</p>	<p>1 that different journals require different</p> <p>2 disclosures. So if you're paid by someone, you</p> <p>3 typically would have to disclose, but the detail</p> <p>4 would -- would vary by journal.</p> <p>5 Q (BY MR. ZELLERS) What methodology or</p> <p>6 methodologies did you use to arrive at your opinion</p> <p>7 that regular use of talcum powder increases a</p> <p>8 woman's risk of developing invasive serous cancer by</p> <p>9 about 50 percent?</p> <p>10 A So I would say there were two parts. The</p> <p>11 first part is my systematic review of the published</p> <p>12 literature. I think I mentioned earlier that I have</p> <p>13 published several systematic reviews.</p> <p>14 And the mechanism of perform -- performing</p> <p>15 those systematic reviews are both ones that I have</p> <p>16 personally used and ones that I was involved in</p> <p>17 developing the methodology as part of my work on the</p> <p>18 Cochrane collaboration.</p> <p>19 So it involves doing a very standardized</p> <p>20 search, creating an approach for abstracting data,</p> <p>21 abstracting the data. An approach that I used for</p> <p>22 summarizing the data, which usually is looking at</p> <p>23 stratified results, results in sort of specific</p> <p>24 categories as opposed to broad categories.</p> <p>25 Statistically summarizing the results and showing</p>

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<p>1 them.</p> <p>2 So part of my conclusion was based on my</p> <p>3 own systematic review. And then part of my</p> <p>4 conclusion was based on my review of the published</p> <p>5 literature on the actual epidemiology data, as well</p> <p>6 as other considerations that went into consideration</p> <p>7 of the Bradford Hill criteria such as mechanistic</p> <p>8 data and any other requirements of Bradford Hill.</p> <p>9 Q Tell us step by step how you performed</p> <p>10 your systematic review or analysis. And now I'm</p> <p>11 referring to the meta-analysis or meta-analysis-like</p> <p>12 review that you did.</p> <p>13 A Okay. So I would just like to do a slight</p> <p>14 preamble to that, which is that the direction that</p> <p>15 my review took was partly informed by having read</p> <p>16 through a number of articles on the topic. So</p> <p>17 determining sort of where there was a gap, what was</p> <p>18 the most important area to focus on. So that sort</p> <p>19 of was the background.</p> <p>20 And then for the review, the literature</p> <p>21 search is the first step. So you want to broadly</p> <p>22 identify all relevant literature, published and</p> <p>23 unpublished, to include.</p> <p>24 And that includes searching on several</p> <p>25 databases -- PubMed was -- Medline were -- Embase,</p>	<p>1 through those and to review to make sure that they</p> <p>2 had primary data.</p> <p>3 So I was only interested in studies that</p> <p>4 had primary data, which meant that review articles</p> <p>5 or editorials or letters to the editors or opinion</p> <p>6 pieces were dropped from that list.</p> <p>7 So then I had data that were -- I had</p> <p>8 studies that had primary data, so that became my</p> <p>9 list of articles.</p> <p>10 And -- and then I created a data</p> <p>11 abstraction form for what variables I wanted to</p> <p>12 include. So some variables are the number of cases;</p> <p>13 the number of controls; the kind of study design</p> <p>14 whether it was a case-control study or another</p> <p>15 design.</p> <p>16 It included -- included the groups that I</p> <p>17 cared most about. So you mentioned serous cancer,</p> <p>18 so I included what kind of histologies they looked</p> <p>19 at.</p> <p>20 I included in my initial data form,</p> <p>21 variables that I ended up not using in my review</p> <p>22 because I didn't have enough data.</p> <p>23 So in my initial draft of variables that I</p> <p>24 might like to abstract was the relationship in pre</p> <p>25 versus postmenopausal women.</p>
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<p>1 Scopus were -- were databases that I started my</p> <p>2 search.</p> <p>3 I included in the report some of the</p> <p>4 keywords I used, keywords including "ovarian cancer,</p> <p>5 talc, perineal powder, genital powder."</p> <p>6 So I generated a long list of articles</p> <p>7 that I retrieved and then reviewed the references</p> <p>8 for each of those articles, which usually doesn't</p> <p>9 identify a lot more articles, but usually identifies</p> <p>10 a few that I may have missed in my search, but that</p> <p>11 other people have found in their reviews or</p> <p>12 systematic reviews. So the first step was to</p> <p>13 identify the literature.</p> <p>14 Q What was the next step? And again, I'm</p> <p>15 focused on your methodology for the systematic</p> <p>16 review or analysis that you did, as reflected in</p> <p>17 your report?</p> <p>18 A So the second step is: Identified a large</p> <p>19 number of publications, but some of them may not</p> <p>20 have been particularly relevant.</p> <p>21 For example, they may have sounded in the</p> <p>22 title like they were primary data, but they may have</p> <p>23 actually only been review data.</p> <p>24 So Step 2 is to review the abstracts for</p> <p>25 all of those identified articles and then to go</p>	<p>1 But when I ended up reviewing articles,</p> <p>2 there just was not -- not enough data there to make</p> <p>3 sense of, so I created a data abstraction form.</p> <p>4 I then went one by one through the</p> <p>5 articles which I organized and abstracted the data</p> <p>6 that I had set out to do.</p> <p>7 And in the course of doing that, I would</p> <p>8 ensure that the participants that were described in</p> <p>9 those reports were, in fact, unique subjects.</p> <p>10 So within this field, just like many</p> <p>11 fields, people sometimes publish an individual</p> <p>12 patient in more than one study. And -- and you</p> <p>13 don't want to include that, if you can.</p> <p>14 So as part of my review was to determine</p> <p>15 how independent the patients were and to make a note</p> <p>16 if there was overlap.</p> <p>17 I also didn't mention some of the features</p> <p>18 that I abstracted. But it wasn't just the primary</p> <p>19 result, which was what was the adjusted odds ratio</p> <p>20 or risk ratio associated with exposure to talcum</p> <p>21 powder products, but it was also -- what I was most</p> <p>22 interested in is quantifying that exposure to a</p> <p>23 degree that had not been present in all the</p> <p>24 individual reviews that I had previously said. So I</p> <p>25 was interested primarily in abstracting data on</p>

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<p>1 regular exposure to talcum powder.</p> <p>2 So when I went through the articles, I</p> <p>3 noted whether -- what the point estimates were, but</p> <p>4 also whether they had information on all of the</p> <p>5 things that were in my database.</p> <p>6 I went through and abstracted data several</p> <p>7 times.</p> <p>8 Q Okay. Well, that's --</p> <p>9 A Oh.</p> <p>10 MS. O'DELL: She may not be done but --</p> <p>11 Q (BY MR. ZELLERS) Well, I understand. So</p> <p>12 I'm just trying to go through your methodology here.</p> <p>13 So after you abstracted the data and</p> <p>14 included it or put it on your data abstraction form</p> <p>15 for each study, what was the next step in your</p> <p>16 systematic review?</p> <p>17 MS. O'DELL: So just continue on, Doctor,</p> <p>18 what your process was.</p> <p>19 A Okay. Well -- so the next step was to</p> <p>20 decide which -- which of those papers might have</p> <p>21 been missing data.</p> <p>22 So once I abstracted the data, there were</p> <p>23 gaps almost certainly in the data. And so I -- I</p> <p>24 just wanted to emphasize -- I was starting to say</p> <p>25 this earlier -- that I -- I went back to the papers</p>	<p>1 Q That's what Dr. Hall did; is that right?</p> <p>2 A That is what Dr. Hall did. I should have</p> <p>3 a caveat there. We -- she absolutely lead that part</p> <p>4 of the analysis, but I reviewed every step of that</p> <p>5 very carefully.</p> <p>6 And there were several places that I --</p> <p>7 I -- I saw errors in some of the calculations that</p> <p>8 we went back and forth on to correct those</p> <p>9 calculation errors.</p> <p>10 Q Have you completed your methodology or the</p> <p>11 different steps in your methodology?</p> <p>12 MS. O'DELL: In terms of the</p> <p>13 meta-analysis?</p> <p>14 Q (BY MR. ZELLERS) Yes. In terms of the</p> <p>15 systematic review or meta-analysis that you did.</p> <p>16 A I believe I have highlighted all the</p> <p>17 steps.</p> <p>18 Q You tried or did correct any errors in</p> <p>19 calculations or numbers by Dr. Hall; is that right?</p> <p>20 MS. O'DELL: Object to the form.</p> <p>21 A Yes, I did.</p> <p>22 Q (BY MR. ZELLERS) Did anyone else review</p> <p>23 your calculations and Dr. Hall's calculations?</p> <p>24 A No. Just the two of us.</p> <p>25 You said something, that I corrected some</p>
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<p>1 and tried to sort of ensure that I was consistently</p> <p>2 pulling the data in my database requirement for</p> <p>3 every study.</p> <p>4 After I did that, the next step would be</p> <p>5 to combine the data statistically. And that would</p> <p>6 be to pro -- perform steps to figure out how the</p> <p>7 data can be -- could be combined.</p> <p>8 And that required looking at issues of</p> <p>9 consistency across the studies or heterogeneity and</p> <p>10 then to make sure that the sub analysis that I</p> <p>11 wanted to do -- the stratified analysis that I</p> <p>12 wanted to do could be done based on whether I had</p> <p>13 data for each of those studies in the stratified</p> <p>14 category.</p> <p>15 So as an example, I wanted to make sure</p> <p>16 that I -- I had whatever information was in the</p> <p>17 paper that could then go to the next step of</p> <p>18 analysis.</p> <p>19 And so that's when, actually, I reached</p> <p>20 out to a biostatistician with -- expert in the</p> <p>21 biostatistical aspect to do two things: To both</p> <p>22 double-check my numbers and ensure that the numbers</p> <p>23 that -- had been abstracted correctly and then to do</p> <p>24 the biostatistical analysis and generate the</p> <p>25 graphical representation of the data.</p>	<p>1 of her numbers. I -- she also corrected some of my</p> <p>2 numbers.</p> <p>3 It was a bi-directional two set of eyes on</p> <p>4 all of the analysis --</p> <p>5 Q I --</p> <p>6 A -- and abstractions.</p> <p>7 Q -- essentially what you did is you</p> <p>8 analyzed the studies. You abstracted data on each</p> <p>9 of the studies on your Data Abstraction Form,</p> <p>10 correct?</p> <p>11 A Yes.</p> <p>12 Q Have you produced your Data Abstraction</p> <p>13 Forms to us for review?</p> <p>14 A I -- I believe I have.</p> <p>15 Q All right. You have them available; is</p> <p>16 that right?</p> <p>17 A Yes.</p> <p>18 Q And this would be a form for each of the</p> <p>19 studies in which you went through and you abstracted</p> <p>20 data; is that right?</p> <p>21 A It's --</p> <p>22 MS. O'DELL: Object to the form. Sorry.</p> <p>23 Go ahead.</p> <p>24 A -- yeah, it's -- it's an electronic</p> <p>25 database. It's an Excel file.</p>

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<p>1 Q (BY MR. ZELLERS) But there would be a form 2 or an Excel sheet for each of the studies where you 3 abstracted the data; is that right? 4 MS. O'DELL: Object to the form. 5 A There's an Excel sheet with each study 6 listed as a separate line of data and many, many 7 rows -- columns for each -- it's not a physical 8 piece of paper and... 9 Q (BY MR. ZELLERS) But it's something that 10 could be printed out; is that right? 11 A Yes. 12 Q All right. Did you develop any type of 13 protocol setting forth the different steps that you 14 followed to do your systematic analysis that you 15 have told us about? 16 A The protocol that I followed for these 17 steps is a very well-established, well-published -- 18 including by myself from any prior reviews -- 19 protocols. 20 Q My question is: Did you write down 21 anywhere, the protocol that you followed for doing 22 this particular systematic review? 23 MS. O'DELL: Object to the form. 24 A I did not specifically write down for this 25 review that I would do a literature search or</p>	<p>1 times week or more as possible and that I would 2 focus on invasive serous cancer wherever possible. 3 And so if that -- if that's what you mean 4 by my "protocol," then yes, that was written down 5 ahead of time. 6 Q (BY MR. ZELLERS) I'm confused. Do you 7 define -- well -- and No. 1, did you produce that 8 protocol? 9 A So I have -- I have my notes and -- which 10 was part of the documents that you saw earlier 11 today. 12 Q The notes, you would describe as your 13 protocol or an outline of your methodology? 14 A Yes. 15 Q All right. We'll mark your notes, which 16 are your protocol, as Exhibit 21. 17 (Exhibit 21 was marked for identification 18 and is attached to the transcript.) 19 Q (BY MR. ZELLERS) And it's just the one 20 side sheet; is that right? 21 A I believe I provided other documents in 22 the datasheet that also has the notes of what group 23 I was focusing on in e-mails that I have sent you. 24 Q That would be other materials that you 25 have produced; is --</p>
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<p>1 abstract data and record points and then do the 2 analysis. 3 Q (BY MR. ZELLERS) What you have done in 4 your systematic review is a subgroup analysis of 5 those studies that you thought should be included; 6 is that fair? 7 A I call it a stratified analysis rather 8 than a subgroup analysis. Usually a subgroup 9 analysis is usually used to describe only limiting 10 to certain groups of patients as opposed to some 11 questions. So I -- I'm not sure that there's a 12 distinction but... 13 Q Well, you -- whether we call it a subgroup 14 or whether we call it a stratified analysis, you 15 went through the studies to try to find the studies 16 that would give you information on women who were 17 regular users, as you defined "regular users," and 18 who developed invasive serous ovarian cancer, 19 correct? 20 MS. O'DELL: Object to the form. 21 A Yes, that's what I did. 22 When you asked about whether I have a 23 protocol written down, I have written that I was 24 going to abstract information about regular use of 25 talc powder products defined as closely as three</p>	<p>1 A That's -- 2 Q -- the right? 3 A -- correct. 4 Q To your knowledge, there's nothing that 5 you have not produced -- 6 A No. 7 Q -- relating -- hold -- 8 A Okay. 9 Q -- on. Let me finish. 10 There's nothing, to your knowledge, that 11 you have not produced relating to your analysis; is 12 that right? 13 A That's correct. 14 Q I was confused. I thought you stated a 15 moment ago that you defined "regular use" as the use 16 of talcum powder three times a week or more. 17 Is that your definition of "regular use"? 18 A I -- 19 MS. O'DELL: Object to the form. 20 A -- I describe the definition in my report 21 on page 32. And -- 22 Q (BY MR. ZELLERS) My question just is: Is 23 that the correct definition or did you use a 24 different definition of "regular use"? 25 MS. O'DELL: Object to the form. You may</p>

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<p style="text-align: right;">Page 158</p> <p>1 describe your --</p> <p>2 A So I -- I --</p> <p>3 MS. O'DELL: -- definition.</p> <p>4 A -- have listed how I have defined it. And</p> <p>5 it's a little bit more -- more nuanced than what you</p> <p>6 have just asked me to confirm.</p> <p>7 Q (BY MR. ZELLERS) What is your definition</p> <p>8 of "regular use" with respect to the systematic</p> <p>9 review and analysis that you did?</p> <p>10 A So I have written, Regular use was defined</p> <p>11 ideally as daily or at least more than three uses</p> <p>12 per week.</p> <p>13 Q More than three uses a week; is that</p> <p>14 right?</p> <p>15 A I -- I wasn't finished. May I finish?</p> <p>16 Q Sure.</p> <p>17 A "I also accepted studies that defined</p> <p>18 "use" as regular where the description made it clear</p> <p>19 that this was regular use.</p> <p>20 A study that reported regular use, but</p> <p>21 defined it as less -- as used less frequency --</p> <p>22 at -- use of less than as -- frequency were not</p> <p>23 included.</p> <p>24 Regular use was selected to differentiate</p> <p>25 occasional use, which may include one-time</p>	<p style="text-align: right;">Page 160</p> <p>1 A -- page --</p> <p>2 MS. O'DELL: -- go ahead.</p> <p>3 A -- 32.</p> <p>4 Q (BY MR. ZELLERS) You have defined "regular</p> <p>5 use" in your report on page 32; is that right?</p> <p>6 A Yes.</p> <p>7 Q What is Dr. Hall's field of expertise?</p> <p>8 A She is a biostatistician who is -- does a</p> <p>9 lot of summaries of systematic review.</p> <p>10 Q You are not a biostatistician; is that</p> <p>11 right?</p> <p>12 A I did a two-year post-graduate fellowship</p> <p>13 in the Department of Epidemiology and Biostatistics,</p> <p>14 have taken many courses in biostatistician --</p> <p>15 biostatistics, and have thought classes in biostatistics</p> <p>16 --</p> <p>17 Q Do you con --</p> <p>18 A -- statistics.</p> <p>19 Q -- do you consider yourself to be an</p> <p>20 expert biostatistician?</p> <p>21 A I consider myself an expert in</p> <p>22 biostatistics.</p> <p>23 Q And Dr. Hall is also an expert in</p> <p>24 biostatistics; is that right?</p> <p>25 A Yes.</p>
<p style="text-align: right;">Page 159</p> <p>1 infrequent use or used along a particular time of a</p> <p>2 woman's menstrual cycle from sustained use.</p> <p>3 Studies that ask participants a single</p> <p>4 question about every use of talc without further</p> <p>5 quantification of exposure were not included for the</p> <p>6 summary.</p> <p>7 For example, Perdue reported that 52 to</p> <p>8 57 percent of women ever using talc without further</p> <p>9 quantification was not included."</p> <p>10 THE COURT REPORTER: Please slow down.</p> <p>11 Q (BY MR. ZELLERS) Okay.</p> <p>12 A Yes.</p> <p>13 Q Doctor, I just wanted to know your</p> <p>14 definition of "regular use."</p> <p>15 A I -- I -- I have spent considerable time</p> <p>16 both writing my definition and applying it to --</p> <p>17 Q What --</p> <p>18 A -- the papers.</p> <p>19 Q -- what page --</p> <p>20 MS. O'DELL: Excuse me, sir. If you were</p> <p>21 asking for the page, she can direct you to the page</p> <p>22 --</p> <p>23 Q (BY MR. ZELLERS) What page --</p> <p>24 A So --</p> <p>25 MS. O'DELL: Doctor --</p>	<p style="text-align: right;">Page 161</p> <p>1 Q Do you know -- well, did you conduct your</p> <p>2 systematic review and analysis using the PRISMA</p> <p>3 standards?</p> <p>4 A Yes.</p> <p>5 Q And those are the preferred reporting</p> <p>6 items for systematic reviews and meta-analyses; is</p> <p>7 that right?</p> <p>8 A Yes.</p> <p>9 Q What materials did you provide to Dr. Hall</p> <p>10 to assist you with your review?</p> <p>11 A I provided her with the data abstraction</p> <p>12 table that had information about each of the</p> <p>13 included studies.</p> <p>14 Q The data abstraction table that you</p> <p>15 prepared; is that right?</p> <p>16 A Yes.</p> <p>17 Q What specifically did Dr. Hall do to</p> <p>18 assist you?</p> <p>19 A She did two things. She personally</p> <p>20 reabstracted data from all of the publications.</p> <p>21 Most of those publications she found on her own.</p> <p>22 But for a couple, she was not able to find them, and</p> <p>23 I provided electronic versions of them.</p> <p>24 And then she statistically combined and</p> <p>25 compared the study to assess for heterogeneity to</p>

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<p>1 calculate forest plots and summary-weighted 2 estimates. 3 Q What could Dr. Hall do with respect to 4 your analysis that you could not? 5 A I did not know how to use the software to 6 generate the graphs. And I thought that by the time 7 I learned how to use that software, it would be a 8 lot more efficient for her to generate them. 9 Q What did you do to check Dr. Hall's work 10 to make sure it was accurate? 11 A Dr. Hall sent me back my data abstraction 12 database where she had double-checked all of my 13 numbers and sent -- I think there were several data 14 points where she had questions about either whether 15 I abstracted the right number or put it in the right 16 category. 17 And of all of the items that she had 18 suggestions -- I think it was a small number -- I 19 went back to the original article to -- to confirm 20 or refute whether I agreed with her changes or not. 21 Sort of a way to -- by consensus to decide what the 22 right answer was. That was part of what I did. I 23 -- 24 Q How -- did you finish? 25 A -- no.</p>	<p>1 A I would not do it in that order. I -- I 2 generated the research questions first. 3 Q (BY MR. ZELLERS) You generated the 4 research questions after doing the initial 5 literature review you told us about this morning, 6 correct? 7 A I -- 8 MS. O'DELL: Object to the form. 9 A -- yes. 10 Q (BY MR. ZELLERS) All right. You 11 identified ten studies that discuss what you define 12 as "regular talc powder product use and risk of 13 ovarian cancer," and those are what you list on a 14 page 33 of your report; is that right? 15 A That's close to correct. I would include 16 in that another study, the Terry study, which is a 17 large study that pulls data from a bunch of other 18 component studies -- you can see on the top of 19 page 34 -- whether or not Terry was included or 20 excluded. The results were basically identical. 21 Q I'm just looking at your report. Your 22 report, on page 33, in Figure 2, you identify ten 23 studies that discuss what you define as "regular 24 talc powder product use and risk of ovarian cancer," 25 correct?</p>
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<p>1 Q All right. Well, finish. 2 A She also generated -- she -- we went back 3 and forth. She had a bunch of questions. 4 But she also generated summary estimates. 5 And there were a bunch of categories that I asked 6 her to do. Some of those summary estimates, to me, 7 seemed like they didn't totally make essence. 8 So one analysis used seven studies and one 9 used nine, but it had the same final odds ratio out 10 to three digits. And it should have been the same 11 result perhaps, but not out to three digits. 12 So I went through those and sort of said: 13 Look, can you redouble-check this to make sure that 14 the weighting was correct? 15 And in one or two cases she came back and 16 said: No, the weighting was not correct. 17 So I rechecked every graph and every 18 number that she generated. 19 Q Ultimately, you identified -- let me 20 withdraw that. 21 You reviewed the studies; you did your 22 data abstraction; and you formulated your research 23 question or questions for the systematic review, 24 correct? 25 MS. O'DELL: Object to the form.</p>	<p>1 MS. O'DELL: Object to the form. 2 A So that -- that paragraph is continued on 3 page 34, the next page at the top which says, The 4 primary analysis of this excluded Terry, but the 5 results were nearly identical if Terry was included. 6 Q (BY MR. ZELLERS) You could have included 7 Terry as part of Figure 2, and that would have been 8 an 11th study; is that right? 9 A Yes, that's correct. 10 Q Why did you not include Terry in your 11 analysis and -- in Figure 2? 12 A Terry included, within its -- within her 13 assembled papers, other patients that are already 14 included in Figure 2. 15 And including Terry would have listed -- 16 would have weighted some patients more than once. 17 Q Is there, to your knowledge, any 18 duplication or overlap in the patients for the ten 19 studies that you list in Figure 2 on page 33 of your 20 report? 21 A To the degree that I could eliminate 22 overlap, I did. 23 Q Is there overlap in some of the patients 24 and some of the studies? 25 A I would have to look at it again to remind</p>

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<p>1 myself if there is any overlap. I -- I don't 2 believe there is. 3 And any overlap, I made every effort to 4 get rid of. I would have to look at those papers a 5 little bit more closely to remember if there was any 6 overlap. 7 I -- I know there was a lot of overlap if 8 I included Terry, which is why that was an important 9 exclusion. 10 Q How did you identify these ten studies 11 that you list in Figure 2? 12 A So I -- I did not identify those studies. 13 That was what -- Dr. Hall used the data that I 14 provided -- to identify which studies had the -- the 15 appropriate data to look at -- look at this. 16 Q How did Dr. Hall identify these ten 17 studies as being the ones to include in Figure 2? 18 A These were the studies that had data on 19 daily talc powder -- powder products. 20 Q You only used subsets of data from these 21 ten studies -- those ten studies listed in 22 Figure 2 -- to reach your conclusions, correct? 23 MS. O'DELL: Object to the form. 24 A I don't remember offhand if I used all of 25 the data from these studies or subsets of data from</p>	<p>1 A I -- I would not -- the individual studies 2 are shown with the confidence interval around those 3 point estimates. 4 One way to establish statistical 5 significance is -- is that statistically different 6 within an individual study than one. 7 But I don't believe that only two of these 8 show statistical significance as a group of studies. 9 So if you're asking if two don't overlap one, then I 10 would agree with you. If you're asking if these 11 together show statistical -- 12 Q (BY MR. ZELLERS) I'm going to ask you -- 13 MS. O'DELL: Excuse me. Sorry. Let her 14 finish. Sorry. 15 Q (BY MR. ZELLERS) Did you finish? 16 A I -- I'm trying to understand if you're 17 asking me if the original studies here show -- or 18 if -- just each line by itself. 19 Q If we go line by line for these ten 20 studies, only two of these ten studies demonstrate 21 statistical significance; is that right? 22 A Yes. 23 Q Yet you conclude by looking at all ten of 24 the studies that there is statistical significance; 25 is that right?</p>
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<p>1 these studies to reach my conclusion. 2 There were only data from these ten 3 studies included in this figure, but I'm not sure if 4 I used all of the data from those studies or 5 subsets, as you asked. 6 Q (BY MR. ZELLERS) Would you agree that only 7 two of the ten studies in Figure 2 demonstrates 8 statistical significance? 9 A I would agree that taken altogether, these 10 studies show statistical significance. But I think 11 you're asking if they weren't taken together, if the 12 original studies were used, would those individual 13 studies show statistical significance? Is that what 14 you are asking? 15 Q No. You have listed out ten studies in 16 Figure 2; is that correct? 17 A Yes. 18 Q You are not aware whether you used all of 19 data from those studies for your systematic review 20 and analysis or subsets of the data, correct? 21 MS. O'DELL: Object to the form. 22 A Yes, that is correct. 23 Q (BY MR. ZELLERS) Would you agree that only 24 two of the ten studies in Figure 2 demonstrate 25 statistical significance?</p>	<p>1 A So the way you're asking the question 2 suggests that when you're combining studies in a 3 systematic review, you care about the initial sample 4 size of the question. 5 And so I conclude taken as a group of 6 studies, the individual sample size or power of the 7 individual associations is not sufficient to come up 8 with a narrow confidence interval. 9 And the width of the confidence interval 10 suggests that while the point estimate is greater 11 than one, the confidence interval overlaps one, 12 meaning you can't be sure if it's significantly 13 significant. 14 But the purpose of the systematic review 15 is to combine those studies together. So combining 16 them together gives a very powerful, positive 17 estimate that's very different than one. 18 Q Okay. 19 MR. ZELLERS: Move to strike as 20 nonresponsive. 21 Q (BY MR. ZELLERS) My question is: When you 22 looked at the ten studies together, you determined 23 that there was statistical significance; is that 24 right? 25 A Yes.</p>

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<p>1 Q How did you make that calculation? How</p> <p>2 did you calculate statistical significance from</p> <p>3 those ten studies?</p> <p>4 MS. O'DELL: Object to the form. I</p> <p>5 believe she has already answered that, but you may</p> <p>6 describe that again, Doctor.</p> <p>7 A So the software that was used, is that</p> <p>8 what you are asking?</p> <p>9 Q (BY MR. ZELLERS) I want to know how it is</p> <p>10 that you calculated that these ten studies -- eight</p> <p>11 of which did not demonstrate statistical</p> <p>12 significance when they were looked at together --</p> <p>13 were statistically significant?</p> <p>14 A So I need to provide you with just a</p> <p>15 little background on the field of systematic reviews</p> <p>16 to answer that question.</p> <p>17 Q All right. Well, try to be as direct as</p> <p>18 you can, because I have only got a certain amount of</p> <p>19 time.</p> <p>20 Are you able to answer the question?</p> <p>21 A Absolutely.</p> <p>22 Q Then please tell us how you calculated</p> <p>23 statistical significance for the RE model.</p> <p>24 A So we looked at adjusted odds ratios of</p> <p>25 each of the studies. We weighted them based on the</p>	<p>1 interval around the odds ratio for each of these ten</p> <p>2 studies?</p> <p>3 MS. O'DELL: Object to the form.</p> <p>4 A So most of the studies, if not all of</p> <p>5 those, would have had published adjusted odds ratios</p> <p>6 in the original calculations.</p> <p>7 I believe one of the studies, the Gertig,</p> <p>8 was an adjusted risk ratio, not an odds ratio, which</p> <p>9 had a bit of back-and-forth discussion with the</p> <p>10 biostatistician.</p> <p>11 And we decided they were essentially</p> <p>12 equivalent. But the other ones would have been</p> <p>13 extracted from the initial studies.</p> <p>14 Q The confidence intervals for the ten</p> <p>15 studies on -- in Figure 2, page 33 of your report</p> <p>16 came from the studies themselves?</p> <p>17 A Yes.</p> <p>18 Q Were there any other selection criteria</p> <p>19 that you used to identify these ten studies, other</p> <p>20 than what you have testified to?</p> <p>21 A No.</p> <p>22 Q Of the 43 or so studies that had primary</p> <p>23 data, are these the only studies, other than Terry,</p> <p>24 that discuss regular use of talc?</p> <p>25 A So I am just looking for where my fullest</p>
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<p>1 standard errors for each of them and calculated sort</p> <p>2 of an overlying association when basically the size</p> <p>3 of each study, the point estimate of each study were</p> <p>4 taken into consideration.</p> <p>5 So taking them altogether, it allows the</p> <p>6 summary estimate, if you look, to have a much</p> <p>7 narrower confidence interval than the individual</p> <p>8 study.</p> <p>9 So you use the weight of all the studies</p> <p>10 to combine the -- to give you a summary estimate.</p> <p>11 Q Where can I see the weighting and the</p> <p>12 calculation that you did to come up with the</p> <p>13 statistically significant number?</p> <p>14 A So the -- the name of the software we used</p> <p>15 was in Metafor package in R. "R" is a program.</p> <p>16 The data set that I provided to you of the</p> <p>17 extracted database, if you put those numbers -- if</p> <p>18 anyone puts those numbers in the Metafor package in</p> <p>19 R and instructs the software that you want to apply</p> <p>20 a -- linear mixed models to study that data set, you</p> <p>21 will get the exact same estimate that I got.</p> <p>22 Q And I will be able to see that from the</p> <p>23 documents that you have produced; is that right?</p> <p>24 A Absolutely.</p> <p>25 Q How did you calculate the confidence</p>	<p>1 of studies is in the report. I think it's pages 23</p> <p>2 and 24.</p> <p>3 The fullest of studies that I looked at</p> <p>4 included -- I think there were seven systematic</p> <p>5 reviews. So the systematic reviews did not</p> <p>6 contribute to the -- they were not eligible for --</p> <p>7 for -- for my own review because they didn't have</p> <p>8 primary data, and they would overlap.</p> <p>9 And the same thing with -- well, the</p> <p>10 Terry, we know about. So it was only the other</p> <p>11 studies that were eligible.</p> <p>12 Q These ten studies that you list in</p> <p>13 Figure 2 are the only studies that you reviewed that</p> <p>14 discuss regular use of talc, and that's why you</p> <p>15 included them here; is that right?</p> <p>16 MS. O'DELL: Object to the form.</p> <p>17 A No, that's -- that's not what I said.</p> <p>18 The systematic reviews I read and had</p> <p>19 data, many of them, on regular use of talc.</p> <p>20 But those were not included in my</p> <p>21 systematic review because that would have had</p> <p>22 overlap of -- of -- of patients. So they were not</p> <p>23 included because it overlapped patients.</p> <p>24 Q (BY MR. ZELLERS) Which studies were those</p> <p>25 seven?</p>

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<p>1 A So they're listed on page 23 as systematic 2 reviews. So Penninkilampi and Berge and the IARC 3 and Langseth and Huncharek and Gross and Harlow. 4 The reason Terry was pulled out from that 5 to possibly include was because Terry provided new 6 data points that weren't included in the component 7 studies, and so I wanted to make sure not to miss 8 those patients. 9 But these other systematic reviews were 10 all covered in the other primary studies that I 11 included. 12 Q Why did you not include the Cramer study, 13 1999? 14 A Cramer was one of the authors that had a 15 lot of patients that kept appearing in subsequent 16 publications. So he published the same patients 17 more than once, so -- 18 Q What analysis did you do to determine that 19 there was overlap between any of the patients 20 reported on by Cramer in 1999 and any of the ten 21 studies that you did choose to include? 22 A I went through -- I think there's a 23 separate page in my data fields that's just 24 attributed to the Cramer studies -- and wrote down 25 what years of enrollment the patients were.</p>	<p>1 Q (BY MR. ZELLERS) If you turn to -- 2 MS. O'DELL: I'll take that. 3 Q (BY MR. ZELLERS) -- turn to Table 2 on 4 page 353, the bottom table -- at the bottom of the 5 table. 6 A Yes. 7 Q Do you see data with respect to "frequency 8 of use per month"? 9 A Yes. 10 Q That's the type of study and the type of 11 information that you did include in your systematic 12 review; is that right? 13 A Yes. 14 Q Is it fair to say that as you sit here 15 today, you just don't remember why you did not 16 include Cramer 1999? 17 MS. O'DELL: Object to the form. 18 A In looking at this, you have convinced me 19 it's not because he doesn't have frequency of use, 20 because there is frequency of use in here. I do not 21 know why it didn't make it into the final database. 22 But I'm looking at my paper from Cramer 23 from 2016, "The Association Between Talc Use and 24 Ovarian Cancer, a Retrospective Case-control Study." 25 He describes -- this is on page 334 of</p>
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<p>1 And to the best I could, I identified the 2 cohorts and then pulled them out to only identify 3 all patients once, which -- which is the reason I 4 hesitated to say there was no overlap. 5 But I did my best to only include every 6 patient once. And -- 7 Q Okay. 8 A -- Cramer got his own worksheet because it 9 was trickier to figure out. 10 Q Cramer 1999 you did not include in your 11 systematic review because you analyzed that paper 12 and the other studies and determined that there was 13 overlap; is that right? 14 A I didn't quite say that. I'm saying that 15 I was very careful not to include overlap patients. 16 I don't know why Cramer 1999 didn't make it into the 17 review. 18 Q I-- 19 A I don't know if he didn't have regular use 20 of talc or -- I -- I -- you know, I would have to -- 21 to figure out why it wasn't included. 22 Q Well, take a look at the Cramer 1999 23 paper, which we'll mark as Exhibit 22. 24 (Exhibit 22 was marked for identification 25 and is attached to the transcript.)</p>	<p>1 that other article -- that data came from three 2 enrollment phases. 3 And my notes on the side say "minus Cramer 4 '99," suggesting -- I don't mind showing you my 5 notes -- showing that there's overlap with Cramer 6 '99 -- 7 Q Okay. 8 A -- so. 9 Q You -- do you believe that the reason you 10 did not include Cramer 1999 is because there was 11 overlap with the patients included in Cramer 2016 or 12 you're not sure? 13 A Yes. 14 MS. O'DELL: Object to the form. 15 Q (BY MR. ZELLERS) Which one is it? 16 MS. O'DELL: Object to the form. 17 A I -- I do not know why it wasn't included, 18 but I believe there was overlap with 2016, is why it 19 was not included. 20 Q (BY MR. ZELLERS) You also did not include 21 Rosenblatt 2011 in your systematic review; is that 22 right? 23 A Rosenblatt was included in the review. 24 But on much -- it looks like it didn't make it into 25 the final graph or the final group of ten.</p>

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<p style="text-align: right;">Page 178</p> <p>1 Q Why did it not make it into the final 2 graph or group of ten? 3 A So I don't -- let me just say I don't 4 remember why Rosenblatt was not included. 5 I specifically asked the biostatistician 6 to do the analysis with and without Rosenblatt, and 7 I believe the reason was -- I believe is that -- the 8 quality of Rosenblatt seems very poor, and I can't 9 remember why. 10 But I asked her to do the analysis with 11 and without Rosenblatt. I asked her to do, I think, 12 four different analyses with and without Terry, with 13 and without Rosenblatt. 14 My recollection is it had no impact. But 15 I do not remember why I asked her with the quality 16 issue -- I would have to go back to my database to 17 remember why I asked her to do it both ways. 18 Q Rosenblatt contained information over -- 19 or strike that -- including a lifetime number of 20 applications and included information on more than 21 10,000 lifetime applications, correct? 22 A Yes. 23 Q All right. 24 A Well, I -- I'm -- I'm looking for it. 25 Yeah, I'm guessing that --</p>	<p style="text-align: right;">Page 180</p> <p>1 Q -- the difference in result? 2 A It -- it had no impact on the overall -- 3 Q Was -- 4 A -- results. 5 Q -- it exactly the same? 6 A It was within a decimal fraction of a 7 percent the same. 8 Q Can you tell us what the result was with 9 Rosenblatt included? 10 A It was the same with and without 11 Rosenblatt included -- 12 Q Is -- 13 A -- within a hundredth of a percent. 14 Q Did you produce that calculation for us? 15 A Within the files that I shared, it is 16 included in the forest plot tables that Dr. Hall 17 generated. 18 Q Go to Figure 2, if you will, in your 19 report, page 33. Do you have that? 20 MS. O'DELL: If you need to see the -- the 21 data that you produced, Doctor, the Excel 22 spreadsheets -- 23 A Oh, that would be great. 24 MS. O'DELL: -- okay. And I -- I'm going 25 to hand you my computer. But it's --</p>
<p style="text-align: right;">Page 179</p> <p>1 Q Here is a -- 2 MS. O'DELL: Don't -- don't. Excuse me -- 3 yeah, don't guess. Just if you know. 4 A -- I -- 5 Q (BY MR. ZELLERS) Exhibit 23 is Rosenblatt. 6 A I have got the paper. 7 MS. O'DELL: Yeah. Feel free to take a 8 moment. And if you need your original spreadsheets 9 to answer any of these detailed questions, then we 10 can pull those out for you -- 11 A Okay. 12 MS. O'DELL: -- if counsel does not have a 13 copy for you. 14 Q (BY MR. ZELLERS) Just for the record, 15 Exhibit 23 is Rosenblatt. 16 (Exhibit 23 was marked for identification 17 and is attached to the transcript.) 18 Q (BY MR. ZELLERS) As you sit here, do you 19 know what the difference in results were if 20 Rosenblatt was included in your systematic review or 21 not? 22 A I -- I do. 23 MS. O'DELL: Object to the form. 24 Q (BY MR. ZELLERS) Okay. What is -- 25 A I do.</p>	<p style="text-align: right;">Page 181</p> <p>1 A Can I -- 2 MS. O'DELL: -- it's the data -- 3 A -- this is what I shared with you. 4 MS. O'DELL: -- and that's what she is 5 discussing. 6 Q (BY MR. ZELLERS) Yeah. I have a question 7 pending. If you can answer my -- if you need to 8 look at your counsel's computer to answer my 9 question, you can. 10 But my question is: Will you look at 11 Figure 2 on page 33 of your report. 12 MS. O'DELL: Just hang on. Just -- what 13 I'm showing the doctor is data that -- the tables 14 that she has been discussing, but you have not 15 provided to her, which would be the fair way to 16 examine here on them. 17 But this is the -- the information that 18 was produced to Defendants for purposes of 19 Dr. Smith-Bindman's, you know, deposition. So if 20 you need that, just -- you may refer to it. 21 Q (BY MR. ZELLERS) Are you ready, 22 Dr. Smith-Bindman? 23 A I'm close to ready, but not quite. 24 Q I -- I'm not sure what you are doing. 25 MS. O'DELL: Well, she is looking at the</p>

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<p style="text-align: right;">Page 182</p> <p>1 calculation that you were just asking her about. 2 Q (BY MR. ZELLERS) I have finished those 3 questions. She has answered those questions. I'm 4 asking a new question. Or I would like to. 5 A Okay. Thank you. 6 MS. O'DELL: You're welcome. If you need 7 to see any of the tables -- 8 A Okay. 9 MS. O'DELL: -- Doctor, I have all that 10 has been produced right here. 11 A Fantastic. 12 Q (BY MR. ZELLERS) Okay. 13 Dr. Smith-Bindman -- Bindman, looking at Figure 2, 14 looking at the confidence intervals that you have 15 listed for each of those ten studies, are you aware 16 that not one of those confidence intervals for any 17 of the ten studies are actually listed in or come 18 from the study publications? 19 MS. O'DELL: Object to the form. 20 A I am not aware of that. 21 Q (BY MR. ZELLERS) In fact, did you 22 recalculate the confidence interval for each of 23 these studies? 24 A The confidence intervals and the point 25 estimate are adjusted confidence intervals and odds</p>	<p style="text-align: right;">Page 184</p> <p>1 (Exhibit 24 was marked for identification 2 and is attached to the transcript.) 3 Q (BY MR. ZELLERS) Is this another e-mail 4 exchange between you and Dr. Hall? Is that yes? 5 A I'm so sorry. I didn't hear your 6 question. 7 Q Sure. My question is: Is this an e-mail 8 exchange between you and Dr. Hall? 9 A Yes. 10 Q If you look at the e-mail at the bottom of 11 the second-to-last page, Dr. Hall writes you on 12 Monday, September 24, 2018, at 11:42, and tells you 13 that she is encountering obstacles; is that right? 14 And I'm sorry. It's the third-to-last 15 page is where that e-mail starts. 16 A I see what you are saying. She has a note 17 at the bottom of the page. 18 Q She tells you she's encountering 19 obstacles? 20 A Yes. 21 Q She asks you a number of questions? 22 A Yes. 23 Q No. 1 is that there's missing proportion 24 information and the data is missing. 25 If you go down to 1B, she says, Where the</p>
<p style="text-align: right;">Page 183</p> <p>1 ratios, so you -- you can't recalculate them from 2 the data in the paper. 3 Q My -- my question is: Who calculated 4 these confidence intervals that appear in Figure 2? 5 Did you calculate those confidence intervals? 6 A To the best of my knowledge, these 7 confidence intervals came from the primary 8 publications. 9 Q And -- and I will represent to you that I 10 have looked at all of the primary publications and 11 the confidence intervals that you have listed in 12 Figure 2. None of those confidence intervals come 13 from the publication. 14 So do you have any idea as to how these 15 confidence intervals were calculated? 16 MS. O'DELL: If there's -- 17 A You would have to show me -- 18 MS. O'DELL: Yes. 19 A -- those -- those disagreements for me to 20 -- 21 Q (BY MR. ZELLERS) Well, let's -- 22 A -- to know what we're looking at. 23 Q -- let's -- I'll get to that in just a 24 second. Let me show you a couple of documents. 25 Deposition Exhibit 24.</p>	<p style="text-align: right;">Page 185</p> <p>1 raw numbers are not available, I would do my best to 2 estimate unless you have access to them and can send 3 them to me. 4 How did you respond to that question? 5 A Can't we see what my answers were? 6 Q Sure. Where are your answers? If you, in 7 any of the documents that have been produced, can 8 show us how you answered these questions, that would 9 be helpful. 10 MS. O'DELL: Object to the form. 11 A I would like to just clarify something in 12 her request, which is she is not asking me in this 13 case for an estimate of the odds ratios or the 14 confidence intervals, even although though it seems 15 like she is. 16 What she is asking for is an estimate of 17 the sample size in terms of the N of cases and N of 18 controls that can be used for weighting those 19 studies in generating the summary estimate. 20 So that's where she's trying to fill in 21 the blanks, not for the odds ratios or confidence 22 intervals, but to calculate -- calculate -- 23 calculate how -- how much weight it should be in the 24 summary statistic. 25 Q (BY MR. ZELLERS) How did you respond to</p>

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<p style="text-align: right;">Page 186</p> <p>1 her first question where she advised you that there 2 was missing proportion information and her proposal 3 that "where the raw numbers are not available, I'll 4 do my best to estimate, unless you have access to 5 them and can send them to me"? 6 MS. O'DELL: Object to the form; asked and 7 answered. 8 A I did not have, other than going to the 9 papers, any additional information to supplement. 10 Q (BY MR. ZELLERS) Okay. No. 2 -- 11 MS. O'DELL: Are you finished, Doctor? 12 A Say it again. 13 MS. O'DELL: Are you finished? 14 A No. 15 MS. O'DELL: Okay. 16 A And so, again, she's not asking me about 17 the abstraction. She's asking me if a study 18 reported, for example, that there were a hundred 19 patients with serous carcinoma or if there were 20 150 patients altogether, it reported the odds ratios 21 for serous carcinoma, but may not have specified in 22 the table how many cases of serous carcinoma there 23 were, could she estimate that proportion when we had 24 the point estimate we needed. 25 We had the odds ratio we needed, but she</p>	<p style="text-align: right;">Page 188</p> <p>1 MS. O'DELL: Object to the form. 2 A We discussed this at length, and she ended 3 up going with Option 3, using relative risk as an 4 underestimation of the odds ratios, but 5 approximately equal because of the rareness of the 6 disease. 7 Q (BY MR. ZELLERS) So she adopted, at your 8 suggestion, the option that she states, 9 understanding that relative risk may considerably 10 underestimate odds ratios; is that right? 11 A Yes, it is. 12 Q And you advised her -- for No. 3, how did 13 you advise her when she told you that she was unable 14 to calculate the true -- or truly estimate for any 15 talc use and suggested that you consider pooling the 16 results from rarely, monthly, weekly, and daily? 17 MS. O'DELL: Object to the form. Are you 18 talking about No. 3? It's not clear. 19 A So the option that we did for that choice 20 is actually neither Option 1 or Option 2. 21 The focus of the review that she completed 22 was, in fact, on daily talc use. It's not different 23 than she suggested. 24 But she used the numbers that were 25 incorrectly categorized as any talc use instead to</p>
<p style="text-align: right;">Page 187</p> <p>1 needed to know how many serous cancers there were to 2 weight it. 3 And I would have told her, when the raw 4 numbers for those missing proportions were not 5 available, to do her best to estimate those. 6 Q (BY MR. ZELLERS) Did you respond to this 7 e-mail? 8 A I sent you all of the documents that I had 9 for our correspondence. 10 Q Okay. 11 A I certainly could look again to see if I 12 have an answer to this. Or it could be that we 13 discussed the answers on the telephone. 14 Q No. 2 -- 15 A Let me just see if we have -- if it says. 16 I think we spoke on the telephone. 17 Q Do you have any notes of that telephone 18 conversation? 19 A No, I don't. 20 Q All right. No. 2, when she told you that 21 she was unable to calculate the associated 22 95 percent confidence intervals without the 23 variants, which is not reported and she gave you 24 three options, which option did you tell her to 25 follow, if any?</p>	<p style="text-align: right;">Page 189</p> <p>1 represent daily talc use, so that -- that data point 2 was moved for the daily talc use category. 3 Q Let me show you the Chang paper. This is 4 one of the papers that you cite both in Figure 2 and 5 again on Figure 3; is that right? 6 A Yes. 7 Q All right. Here's the Chang paper which 8 we have marked as Exhibit 25. 9 A Oh. 10 (Exhibit 25 was marked for identification 11 and is attached to the transcript.) 12 Q (BY MR. ZELLERS) Do you have that in front 13 of you? 14 A I do. 15 Q Okay. Show us -- you see in Figure 2, 16 that Chang is listed twice, and it has a confidence 17 interval of .51 to 1.39. 18 Do you see that? 19 A You said it's listed twice? 20 Q I'm sorry. It was -- it's listed in 21 Figure 2 and then you list it again in Figure 3; is 22 that right? 23 A Yes. 24 Q All right. The first question is: Where 25 in the Chang publication do you get a confidence</p>

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<p>1 interval of .51 to 1.39?</p> <p>2 A Hum? So the point estimate that I</p> <p>3 think -- I need to look at the paper a little more</p> <p>4 closely.</p> <p>5 So the number I see in this paper is</p> <p>6 instead of being .51 to 1.39 is .61 to 1.49 is about</p> <p>7 ten points higher.</p> <p>8 Q All right. You don't know where, for</p> <p>9 Figure 2, the confidence interval of .51 to 1.39</p> <p>10 came from, correct?</p> <p>11 A I -- I do not. It's so close to the</p> <p>12 publication -- the publication that I'm not sure if</p> <p>13 it reflects a data abstraction error or if it was --</p> <p>14 I think that's probably what it -- what it does, but</p> <p>15 I'm not sure.</p> <p>16 Q The Chang paper involved 450 patients with</p> <p>17 borderline and invasive ovarian carcinoma; is that</p> <p>18 right?</p> <p>19 A Say it one more time for me.</p> <p>20 Q Sure. The Chang paper --</p> <p>21 A Yeah.</p> <p>22 Q -- Exhibit 25, involved a total of</p> <p>23 450 patients with borderline and invasive ovarian</p> <p>24 carcinoma; is that right?</p> <p>25 A Yes.</p>	<p>1 notes here, but I believe what I did for Chang is</p> <p>2 that Chang's numbers are included in the Terry</p> <p>3 report where she used the data that were published,</p> <p>4 as well as the supplemental data that were provided</p> <p>5 by Chang.</p> <p>6 And within the supplemental data, Terry</p> <p>7 did a stratified analysis that provided additional</p> <p>8 information on serous cancer that was not actually</p> <p>9 in the original Chang report.</p> <p>10 And those are the data that made it into</p> <p>11 what is under Chang in this systematic review.</p> <p>12 Q (BY MR. ZELLERS) Okay.</p> <p>13 A So they're data from Chang's work and</p> <p>14 following Chang's methods. They happen not to be</p> <p>15 published in Chang's original report, but rather</p> <p>16 included in the Terry report from -- from 2013.</p> <p>17 And Terry -- the paper that I am talking</p> <p>18 about for Terry is genital powder use and risk of</p> <p>19 ovarian cancer, a pooled analysis of 8,500 cases and</p> <p>20 ninety-eight hundred fifty-nine controls.</p> <p>21 And then within that describes within the</p> <p>22 methods, getting extra data for studies describing</p> <p>23 the regular use and then breaking down the results</p> <p>24 into whether or not it was invasive borderline,</p> <p>25 invasive serous, and so forth --</p>
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<p>1 Q You used or Dr. Hall used, in your</p> <p>2 analysis, only 41 of those 450 patients because</p> <p>3 those are the only ones that had greater than</p> <p>4 25 times of use per month, correct?</p> <p>5 A So I would need to look at my datasheet to</p> <p>6 know how many made it into the analysis, but I</p> <p>7 believe you're correct, that there were</p> <p>8 approximately 10 percent that were frequent users.</p> <p>9 Q How did you determine, just looking at the</p> <p>10 Chang paper, how many of those 41 had invasive</p> <p>11 serous ovarian cancer?</p> <p>12 MS. O'DELL: If you need to look at your</p> <p>13 datasheets --</p> <p>14 A Please.</p> <p>15 MS. O'DELL: Which --</p> <p>16 A That would be great.</p> <p>17 MS. O'DELL: -- which data -- tell -- data</p> <p>18 summary, is that what --</p> <p>19 A Yeah --</p> <p>20 MS. O'DELL: -- you are --</p> <p>21 A -- that should be it.</p> <p>22 MS. O'DELL: Okay. This is both --</p> <p>23 both -- both of the spreadsheets are there, so just</p> <p>24 --</p> <p>25 A Okay. So I don't have all of my detailed</p>	<p>1 Q So --</p> <p>2 A -- so that's where those numbers came</p> <p>3 from.</p> <p>4 Q You believe that if I looked at the Terry</p> <p>5 paper, I would be able to tell of these 41 cases</p> <p>6 that have greater than 25 uses per month, which of</p> <p>7 those cases involved invasive serous ovarian cancer,</p> <p>8 correct?</p> <p>9 MS. O'DELL: Object to the form.</p> <p>10 A I believe the -- I believe the number of</p> <p>11 cases is specified in the Terry paper that I would</p> <p>12 have to look at to find that -- that number.</p> <p>13 Q (BY MR. ZELLERS) All right. Let me ask</p> <p>14 you a few questions.</p> <p>15 A Yes.</p> <p>16 Q In the Chang paper --</p> <p>17 A Yes.</p> <p>18 Q -- the authors do not define "regular use"</p> <p>19 as daily, do they?</p> <p>20 A What Chang says in the original</p> <p>21 publication is questions about regular talc use and</p> <p>22 type of talc use, as well as duration and frequency</p> <p>23 could be derived or included; dusting or powdering</p> <p>24 behavior considered improved regular application of</p> <p>25 talc to the perineum after showering or bathing and</p>

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<p>1 dusting.</p> <p>2 And then that was categorized, I believe</p> <p>3 by Terry, as regular use when she got supplemental</p> <p>4 data.</p> <p>5 Q Okay. In the Chang paper, the authors do</p> <p>6 not define "regular use" as daily use, correct?</p> <p>7 MS. O'DELL: Object to the form; asked and</p> <p>8 answered.</p> <p>9 A The Chang paper explicitly says "regular</p> <p>10 use." In the original publication, they don't</p> <p>11 define it.</p> <p>12 Q (BY MR. ZELLERS) They do not include</p> <p>13 information in the Chang paper about how many times</p> <p>14 per week women used talcum powder, correct?</p> <p>15 MS. O'DELL: Object to the form.</p> <p>16 A In -- in Table 2 of Chang, they define it</p> <p>17 as less than ten, ten to 25, or greater than 25</p> <p>18 times per week.</p> <p>19 Q (BY MR. ZELLERS) Where do you see that?</p> <p>20 A In Chang?</p> <p>21 Q Yes. I'm looking at the same table, and I</p> <p>22 think it's per month.</p> <p>23 A Per month.</p> <p>24 Q Okay. And that's the only data that's</p> <p>25 provided with respect to use is the number of</p>	<p>1 of invasive besides just serous.</p> <p>2 Q Do you know that?</p> <p>3 A I -- I don't think they specify what's</p> <p>4 included in that. I have to add up the total to see</p> <p>5 if they are overlapping or not overlapping.</p> <p>6 Could you add -- could you add that for</p> <p>7 me? Actually, the total should be -- they're</p> <p>8 overlapping. 360, 460. Yeah, they're overlapping.</p> <p>9 Yeah.</p> <p>10 Q What do you mean, "they're overlapping"?</p> <p>11 A Invasive and borderline should add up to</p> <p>12 the total.</p> <p>13 And then serous mucin -- mucinous and</p> <p>14 endometrioid should add up to the total, except to</p> <p>15 the degree that they are missing information.</p> <p>16 Q Looking at the questions that Dr. Hall</p> <p>17 asked you --</p> <p>18 A Yes.</p> <p>19 Q -- in Exhibit 24, you would agree that</p> <p>20 there were number of assumptions that you and she</p> <p>21 made in order to complete your systematic review; is</p> <p>22 that right?</p> <p>23 A Absolutely.</p> <p>24 Q Is there anywhere that you have written</p> <p>25 down, you know, what the assumptions were that you</p>
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<p>1 monthly applications, correct?</p> <p>2 A Yes.</p> <p>3 Q The authors of Chang did not arrive at a</p> <p>4 specific odds ratio for serous invasive cancer based</p> <p>5 on frequency of use, correct?</p> <p>6 A The Chang data was used by Terry to</p> <p>7 calculate frequency of use for serous and invasive</p> <p>8 by supplementing the original data that they had</p> <p>9 from additional data from Chang as a participant in</p> <p>10 the OCAC consortium.</p> <p>11 So additional data from that study was</p> <p>12 shared with Terry, which is what we used in our</p> <p>13 analysis.</p> <p>14 Q If we look at Chang in Table 3, they</p> <p>15 describe a histologic type of invasive; is that</p> <p>16 right, in Table 3, page 2399?</p> <p>17 A Yes.</p> <p>18 Q They also describe serous; is that right?</p> <p>19 A Yes.</p> <p>20 Q In the Chang data, what's the difference</p> <p>21 between invasive and serous?</p> <p>22 A I'm -- I'm sorry. In lot -- in Table 3</p> <p>23 you're asking what those different entries mean?</p> <p>24 Q Yes.</p> <p>25 A "Invasive" presumably includes other types</p>	<p>1 and Dr. Hall arrived at, at least in part in</p> <p>2 response to her questions?</p> <p>3 A So for some of the issues, it took me</p> <p>4 quite a bit of remembering to remember that we used</p> <p>5 some of the extracted data from more than one</p> <p>6 source.</p> <p>7 We have notes in our data form of what the</p> <p>8 source of the data was, so it would say in some of</p> <p>9 the data I said -- under Chang, it would say "in a</p> <p>10 column from Terry."</p> <p>11 Q My question --</p> <p>12 A So that -- that -- so to answer the</p> <p>13 assumption of where the data came from, it's in my</p> <p>14 data spreadsheet. I just -- I just didn't remember</p> <p>15 that we pulled data.</p> <p>16 Q My -- my question is a little different I</p> <p>17 --</p> <p>18 A Okay.</p> <p>19 Q -- think. In terms of all of the</p> <p>20 questions that Dr. Hall asked you and all of the</p> <p>21 assumptions that would need to be made so that</p> <p>22 estimates could be arrived at, do you have either</p> <p>23 your protocol or a listing of the assumptions that</p> <p>24 were made by you and by Dr. Hall in -- at least in</p> <p>25 part in response to the question she raised?</p>

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<p>1 MS. O'DELL: Objection, asked and</p> <p>2 answered. Respond.</p> <p>3 A I am under the impression that they're</p> <p>4 documented within our e-mail exchanges, but I do not</p> <p>5 have a protocol with each of these decisions that</p> <p>6 are laid out.</p> <p>7 Q (BY MR. ZELLERS) I -- my best source would</p> <p>8 be the e-mail exchanges that you had with Dr. Hall,</p> <p>9 correct?</p> <p>10 MS. O'DELL: Object to the form.</p> <p>11 Q (BY MR. ZELLERS) Is that right?</p> <p>12 A Yes.</p> <p>13 Q Okay. Once you did your ten studies that</p> <p>14 are in Figure 2 -- and those were just the --</p> <p>15 the studies that you chose to include, as you have</p> <p>16 told us, showing odds of ovarian cancer associated</p> <p>17 with regular use of talcum powder -- you further</p> <p>18 refined the studies or narrowed down the studies to</p> <p>19 four which you state plot or who the odds of ovarian</p> <p>20 cancer associated with regular use of talcum powder</p> <p>21 and invasive serous cancer; is that right?</p> <p>22 MS. O'DELL: Object to the form.</p> <p>23 A With the caveat that when -- when I laid</p> <p>24 out our stratified analysis on page 32, it says, My</p> <p>25 review focused on invasive serous cancer where</p>	<p>1 confidence interval for the -- let's say the Chang</p> <p>2 data that you list in Figure 3?</p> <p>3 A I'm going to have to look into the exact</p> <p>4 calculation of the confidence interval.</p> <p>5 The question that you asked me about Chang</p> <p>6 for the first table is very close to the one that's</p> <p>7 published -- so close -- that I'm not sure how it</p> <p>8 would be different.</p> <p>9 I don't -- I thought these were abstracted</p> <p>10 from the paper. And I would have to go back and</p> <p>11 talk to Dr. Hall about how they were calculated.</p> <p>12 I thought they were calculated, but I -- I</p> <p>13 may be -- I may be wrong. They may have been in</p> <p>14 some way reestimated.</p> <p>15 So again, similar with this, these numbers</p> <p>16 are close to the ones that are in this paper, but</p> <p>17 are slightly off, and I'm not sure why.</p> <p>18 So I would have to go back to the data</p> <p>19 that I abstracted and then the data that she sent me</p> <p>20 back for the final tables to see why they were</p> <p>21 different.</p> <p>22 Q Okay.</p> <p>23 A But they're -- they're different to a --</p> <p>24 such a slight degree that -- and I'm not really sure</p> <p>25 where that difference came from.</p>
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<p>1 possible, but also included all invasive cancer.</p> <p>2 Q (BY MR. ZELLERS) What did you do to get</p> <p>3 from the ten studies that you list in Figure 2 to</p> <p>4 the four studies that you list in Figure 3?</p> <p>5 A Figure 2 is ovarian cancer with regular</p> <p>6 use, and Figure 3 is invasive serous cancer.</p> <p>7 If there was not invasive serous but there</p> <p>8 was just invasive, they also might be in this. I</p> <p>9 would have to review these four studies to know if</p> <p>10 it was invasive or invasive serous.</p> <p>11 Q Do you know, as you sit here, what you did</p> <p>12 to go from the ten studies in Figure 2 to the four</p> <p>13 studies in Figure 3?</p> <p>14 MS. O'DELL: Object to the form.</p> <p>15 A In the data set that I sent to you and</p> <p>16 sent to Dr. Hall, they would -- there were different</p> <p>17 sets of complete data. And the Figure 3 had data</p> <p>18 for invasive or invasive serous cancer; whereas,</p> <p>19 Figure 2 had -- included invasive and noninvasive.</p> <p>20 So it would just be where there were data</p> <p>21 available in the data worksheet. I -- I was not</p> <p>22 involved in making the selection to go from one to</p> <p>23 the other. It was just where there were data that</p> <p>24 were abstracted from the papers.</p> <p>25 Q (BY MR. ZELLERS) Where did you get the</p>	<p>1 Q Were there any other analyses that you or</p> <p>2 Dr. Hall con -- conducted that are not included in</p> <p>3 your report?</p> <p>4 A I had asked Dr. Hall, I believe, to look</p> <p>5 at -- at several analyses that are all in the data</p> <p>6 that I shared with you.</p> <p>7 The sensitivity analysis for Terry and the</p> <p>8 sensitivity analysis for the Rosen [sic] study are</p> <p>9 in the data I sent you, but are not summarized in</p> <p>10 the report.</p> <p>11 MS. O'DELL: And by "the data," you're</p> <p>12 talking about the spreadsheets --</p> <p>13 A Yes.</p> <p>14 MS. O'DELL: -- that you provided?</p> <p>15 A Yes. There -- there are more analyses</p> <p>16 that were done that you haven't seen. But they --</p> <p>17 they were analysis for four analyses.</p> <p>18 I just see two here. So I -- there were</p> <p>19 two others. I think it was including Terry and</p> <p>20 including Rosenblatt, I think, are the other two.</p> <p>21 But you have all of the -- there were no</p> <p>22 other analyses except those four that she completed.</p> <p>23 MS. O'DELL: Excuse me, Mike. I'm sorry.</p> <p>24 We're right at 3:00 p.m. When you get to a stopping</p> <p>25 point, can we take a break?</p>

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<p style="text-align: right;">Page 202</p> <p>1 MR. ZELLERS: All right. Let's stop. 2 We're stopping for the day; is that right? 3 MS. O'DELL: Let's -- let me speak with 4 Dr. Smith-Bindman on the break and then I'll let you 5 know. 6 MR. ZELLERS: All right. 7 THE VIDEOGRAPHER: We're off the record at 8 2:59 p.m. 9 (A break was taken from 2:59 p.m. to 10 3:11 p.m.) 11 THE VIDEOGRAPHER: We are back on the 12 record. This marks the beginning of Disc No. 4 in 13 the deposition of Dr. Rebecca Smith-Bindman. The 14 time is 3:11 p.m. 15 Q (BY MR. ZELLERS) Dr. Smith-Bindman, what 16 methodology, if anything different, did you use to 17 arrive at your opinion that there was a causal 18 association between genital talcum powder use and 19 ovarian cancer? 20 A I used the Bradford Hill criteria. 21 Q Are you familiar with the Bradford Hill 22 criteria? 23 A I am. Yes, I am. 24 Q You're familiar that over time the FDA has 25 gone through and done various analyses with respect</p>	<p style="text-align: right;">Page 204</p> <p>1 Q The FDA, in 2014, reviewed the 2 epidemiology and etiology findings relating to 3 ovarian cancer and the genital application of talc; 4 is that right? 5 MS. O'DELL: Object to the form. 6 A Yes. 7 Q (BY MR. ZELLERS) The FDA noted that 8 selection bias and/or uncontrolled confounding 9 result in spurious positive associations between 10 talc use and ovarian cancer; is that right? 11 MS. O'DELL: Object to the form. 12 A The FDA concluded that some of the studies 13 had biases. Yes, they did. 14 Q (BY MR. ZELLERS) And if we look at No. 2, 15 the FDA states, No single study has considered all 16 the factors that potentially contribute to ovarian 17 cancer, including selection biased and/or 18 uncontrolled confounding that result in spurious 19 positive associations between talc use and ovarian 20 cancer risk. 21 Is that right? 22 A That is what the FDA concluded. 23 Q The FDA also noted that there was a lack 24 of consistency in the study results; is that right? 25 A That is what the FDA concluded.</p>
<p style="text-align: right;">Page 203</p> <p>1 to perineal talcum powder use and any association 2 with ovarian cancer; is that right? 3 MS. O'DELL: Object to the form. 4 A I -- I have seen some documents by the 5 FDA. 6 Q (BY MR. ZELLERS) And the FDA, back in 7 2014, did a review and analysis of the epidemiology 8 at that time; is that right? 9 MS. O'DELL: Object to the form. 10 A Could you show me that document? 11 Q (BY MR. ZELLERS) Sure. This is a document 12 that we'll mark as Exhibit 26. 13 (Exhibit 26 was marked for identification 14 and is attached to the transcript.) 15 Q (BY MR. ZELLERS) It's a document from the 16 FDA. It's got a date stamp at the top -- 17 MS. O'DELL: Thank you. 18 Q (BY MR. ZELLERS) -- April 1 of 2014. 19 Is this one of the documents that you have 20 reviewed in connection with your expert work in this 21 matter? 22 A Yes, it is. 23 Q Turn, if you will, to page 4 of that 24 document. Do you see that? 25 A Yes.</p>	<p style="text-align: right;">Page 205</p> <p>1 Q And specifically the FDA concludes, 2 Results of case-control studies do not demonstrate a 3 consistent, positive association across studies; is 4 that right? 5 MS. O'DELL: I think it says something 6 further than that. 7 A Can I just add something? This -- the FDA 8 did some review that I don't know the details of. 9 And this is their summary of that review, which I 10 don't know the details of, yes. 11 Q (BY MR. ZELLERS) The FDA, at least in this 12 review, stated that dose response evidence is 13 lacking; is that right? 14 And I am looking at the end of Point No. 3 15 on page 4. 16 A That is what the FDA concluded. 17 Q And looking at Point No. 4, the FDA found 18 that a cogent biological mechanism was lacking; is 19 that right? 20 A That is what the FDA concluded. 21 Q You have reviewed IARC; is that right? 22 And I think in your blue folder here you have 23 included some IARC documents? 24 A I have included IARC work reflecting 25 analysis through 2006 and then more recently</p>

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<p>1 through -- through 2010, each published a few years 2 after that.</p> <p>3 Q IARC has gone through and addressed the 4 Bradford Hill considerations with respect to the 5 classification of genital talc; is that right?</p> <p>6 MS. O'DELL: Object to the form.</p> <p>7 A Can you remind me which analysis you're 8 referring to?</p> <p>9 Q (BY MR. ZELLERS) Well, let's start with 10 the classifications. Take a look at Exhibit 27, if 11 you will.</p> <p>12 (Exhibit 27 was marked for identification 13 and is attached to the transcript.)</p> <p>14 Q (BY MR. ZELLERS) Are these the IARC 15 classifications for its determination --</p> <p>16 MS. O'DELL: Thank you.</p> <p>17 Q (BY MR. ZELLERS) -- as to the 18 carcinogenicity -- carcinogenicity of different 19 agents?</p> <p>20 A Yes.</p> <p>21 Q And you're generally familiar with these 22 classifications; is that right?</p> <p>23 A I am.</p> <p>24 Q Group 1, these are the agents that IARC 25 has determined are carcinogenic to humans, correct?</p>	<p>1 prove that something is safe is -- is next to 2 impossible --</p> <p>3 Q (BY MR. ZELLERS) Right.</p> <p>4 A -- and so that's why that category is 5 not -- is used. Category 3 and four can, for the 6 sake of discussion, be considered the same.</p> <p>7 Q And that's why there's no Group 5, not 8 carcinogenic; is that right?</p> <p>9 A Yes.</p> <p>10 Q Correct? Now, with genital talc, IARC has 11 determined that it is appropriately placed in the 12 "to be" category; is that right?</p> <p>13 MS. O'DELL: Object to the form.</p> <p>14 A I -- I would take a slight pause to that 15 consideration. I think that in the first review 16 when they have looked at platy talc, they consider 17 it a "to be" possibly carcinogenic to humans.</p> <p>18 Whereas, in the report looking at asbestos 19 and fibrous talc, which also counts in the same 20 category as asbestos, the -- that is in the category 21 that's a Group 1 carcinogenic to humans.</p> <p>22 Q (BY MR. ZELLERS) IARC has determined that 23 genital talc is a group to be possibly carcinogenic 24 to humans; is that right?</p> <p>25 MS. O'DELL: Object to the form.</p>
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<p>1 A Yes.</p> <p>2 Q And that's the only category in which IARC 3 finds sufficient evidence in humans; is that right?</p> <p>4 MS. O'DELL: Object to the form.</p> <p>5 A That's how they define that category.</p> <p>6 Q (BY MR. ZELLERS) IARC puts 82 agents in 7 Group 2A probably carcinogenic to humans; is that 8 right?</p> <p>9 A That is correct.</p> <p>10 Q So IARC has gone through and has evaluated 11 many, many, many agents and has determined that 12 there are over 200 agents in both the Group 1 13 category and also the Group 2A category, correct?</p> <p>14 A Yes.</p> <p>15 Q There's only one agent in Group 4, 16 probably not carcinogenic to humans; is that right?</p> <p>17 MS. O'DELL: Object to the form.</p> <p>18 A Yes, that's correct.</p> <p>19 Q (BY MR. ZELLERS) So out of the over a 20 thousand agents that IARC has reviewed, it's only 21 placed one agent in Group 4 probably not 22 carcinogenic; is that right?</p> <p>23 MS. O'DELL: Object to the form.</p> <p>24 A To be considered by IARC, there has to be 25 data to suggest there's some potential harm. And to</p>	<p>1 Misstates her testimony.</p> <p>2 A So in their initial review -- in their 3 earlier review, they concluded that genital talc is 4 possibly carcinogenic to humans.</p> <p>5 In the more recent 2012, they discuss that 6 cosmetics are the primary sources of exposure to 7 talc in the general population; that perineal 8 application is the primary route and that fibrous 9 talc, which is part of talc, is actually Group 1 10 carcinogenic.</p> <p>11 Q (BY MR. ZELLERS) All right. Show me the 12 IARC designation of genital talc as a Group 1 13 carcinogenic.</p> <p>14 MS. O'DELL: Object to the form.</p> <p>15 A Genital talc contains platy talc, as well 16 as fibrous talc, as well as asbestiform contaminated 17 talc, and they consider any fibrous talc to be a 18 Group 1 carcinogen.</p> <p>19 Q (BY MR. ZELLERS) Show me where the 20 perineal application of genital talc has been 21 determined by IARC to be a Group 1 carcinogen.</p> <p>22 MS. O'DELL: Object to the form. Would 23 you like to see the IARC?</p> <p>24 A Can you show me the IARC report?</p> <p>25 Q (BY MR. ZELLERS) No. I would like you --</p>

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<p>1 you're the one who is testifying.</p> <p>2 A I just don't have the document in front of</p> <p>3 me. How would you like me to show it to you?</p> <p>4 Q I -- I would like you to show me where</p> <p>5 genital talc has been found by IARC to be a Group 1</p> <p>6 carcinogen.</p> <p>7 MS. O'DELL: Object to the form. So was</p> <p>8 that not -- excuse me, Doctor. Is that not</p> <p>9 something you're going to put in front of her?</p> <p>10 Q (BY MR. ZELLERS) I -- I have my</p> <p>11 information. And my IARC review says that they have</p> <p>12 classified genital talc as a group to be possibly</p> <p>13 carcinogenic to humans.</p> <p>14 A Do you have the 2012 --</p> <p>15 MS. O'DELL: Yes. Let me just get it for</p> <p>16 you, Doctor. Give me a moment to see what number it</p> <p>17 is in your references.</p> <p>18 Q (BY MR. ZELLERS) As your counsel is</p> <p>19 looking for that document, can we agree that the "to</p> <p>20 be" designation with IARC is based on limited</p> <p>21 evidence in humans, which means IARC cannot rule out</p> <p>22 chance, bias, or confounding with reasonable</p> <p>23 confidence?</p> <p>24 A In their original assessment of talc in</p> <p>25 2010 where they classified it as to be, the "to be"</p>	<p>1 A So this is the monograph -- the</p> <p>2 monograph -- the IARC monograph on the evaluation of</p> <p>3 carcinogenic risks -- arsenic metals, fibrous and</p> <p>4 dust, volume 100C. So --</p> <p>5 Q I'm looking for perineal talc.</p> <p>6 A No. No. I know. I understand.</p> <p>7 Q Okay.</p> <p>8 A I'm just telling you where I'm -- I'm</p> <p>9 going to be pulling this from. And I'm looking at</p> <p>10 the section under "Asbestos." And under the Pier --</p> <p>11 the -- the section under "Asbestos, it talks, under</p> <p>12 1.C --</p> <p>13 Q What page?</p> <p>14 A -- 230. And I will read several sections</p> <p>15 of it. This section says, Talc particles are</p> <p>16 normally plate-like. These particles are viewed on</p> <p>17 edge under the microscope.</p> <p>18 THE COURT REPORTER: I have to have you</p> <p>19 slow down when you read.</p> <p>20 A I'm so sorry. May appear to be fibers.</p> <p>21 Talc may also form true mineral fibers that are</p> <p>22 asbestiform in habit.</p> <p>23 In some talc deposits, tremolite,</p> <p>24 anthophyllite, and actinolite may occur. Talc</p> <p>25 containing asbestiform fibers is a term that has</p>
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<p>1 designation means that it's possibly carcinogenic,</p> <p>2 which is a very high bar for them to put them in</p> <p>3 that category, but could also be due to chance.</p> <p>4 Q Okay. Also, in class "to be" as possibly</p> <p>5 carcinogenic is ginkgo biloba; is that right?</p> <p>6 A I -- I have no idea.</p> <p>7 Q Occupational carpentry and joinery; is</p> <p>8 that right?</p> <p>9 A I -- I -- I have no idea.</p> <p>10 Q Pickled --</p> <p>11 A I --</p> <p>12 Q -- vegetables?</p> <p>13 A -- I think pickled vegetables are pretty</p> <p>14 carcinogenic, but I -- I don't know what IARC thinks</p> <p>15 of them.</p> <p>16 Q Do you believe that the standard for</p> <p>17 prove -- proving causation in the scientific</p> <p>18 literature is the same as the one that applies in</p> <p>19 litigation?</p> <p>20 A Yes, I do.</p> <p>21 Q Do you want to show me what your counsel</p> <p>22 has provided you?</p> <p>23 A Yes.</p> <p>24 Q And I am looking for the finding that IARC</p> <p>25 that genital talc use is a Group 1 carcinogen.</p>	<p>1 been used inconsistently.</p> <p>2 I'm -- I'm just seeing where the --</p> <p>3 Q (BY MR. ZELLERS) That's okay. And I am</p> <p>4 looking for the statement or the finding that</p> <p>5 genital talc -- cosmetic genital talc has been</p> <p>6 determined by IARC to be a Group 1 carcinogen.</p> <p>7 A So I'm in the section --</p> <p>8 MS. O'DELL: Object to the form.</p> <p>9 A -- on the talc and asbestiform talc. And</p> <p>10 under 1.65, "Human Exposure," under "A," it says,</p> <p>11 Exposure of the general population: Consumer</p> <p>12 products, cosmetics, pharmaceuticals are the primary</p> <p>13 source of exposure to talc for the general</p> <p>14 population. Inhalation and dermal contact through</p> <p>15 perineal application are the primary routes of</p> <p>16 exposure.</p> <p>17 Q (BY MR. ZELLERS) Where does IARC conclude</p> <p>18 that perineal talc use, cosmetic talc, is a Group 1</p> <p>19 carcinogen?</p> <p>20 MS. O'DELL: Object to the form.</p> <p>21 A As late as 1973, talc products contained</p> <p>22 detectable levels of chrysotile asbestos, tremolite,</p> <p>23 or anthophyllite role. And it's possible they</p> <p>24 remained on the market in some places for some time</p> <p>25 after that. And these are asbestiform in habit.</p>

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<p>1 It goes on to cite a whole lot of other 2 places, Blount and so forth. 3 And then in this same document they 4 categorize the asbestos and asbestiform fibers as 5 being a Group 1 carcinogen. 6 Q (BY MR. ZELLERS) I'm going to ask you 7 about asbestos and I'm going to ask you about 8 asbestiform fibers. 9 What I want to know is: Where does IARC, 10 in the publication you're looking at, categorize 11 cosmetic talc applied perineal -- to the perineal 12 region as a Group 1 carcinogen? 13 MS. O'DELL: Object to the form. 14 A They're telling us in this document that 15 asbestos and asbestiform talc are Group 1 16 carcinogens. 17 They're telling us at the cite -- the -- 18 the most common exposure is consumer products. And 19 inhalation and dermal contact with perineal 20 application of talc powders are the primary routes 21 of exposure. 22 Q (BY MR. ZELLERS) Where does IARC state 23 that perineal use of cosmetic talc is a Group 1 24 carcinogen? 25 MS. O'DELL: Object to the form.</p>	<p>1 MS. O'DELL: As I'm not coaching the 2 witness. So you can ask the questions, but you 3 can't raise your voice and -- and continue -- 4 MR. ZELLERS: We have a video record. 5 MS. O'DELL: -- yes, we do. 6 MR. ZELLERS: No one here would say that 7 I'm raising my voice to the witness or behaving in 8 any way other than professionally. 9 A I'm looking for the executive summary. 10 It's just taking a while in this very large document 11 to -- I see the problem. 12 The copy of this document, I'm missing my 13 first few pages. 14 Q (BY MR. ZELLERS) Okay. 15 A It starts at 30 -- 31. 16 THE COURT REPORTER: Did you say "few" or 17 "first three"? 18 A I think I'm missing the first 30 pages. 19 Q (BY MR. ZELLERS) All right. Let -- 20 A So -- 21 Q -- me move on then. 22 A -- okay. 23 Q Strength of association is a Bradford Hill 24 criteria -- is that -- criterion; is that right? 25 A Yes, it is.</p>
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<p>1 A So IARC is telling us which compounds are 2 Group 1 carcinogens. 3 Q (BY MR. ZELLERS) Where does it state that 4 the perineal use of cosmetic talc is a Group 1 5 carcinogen? 6 MS. O'DELL: Object to the form. She has 7 already stated that three times. 8 MR. ZELLERS: Well, I haven't heard it 9 yet -- 10 MS. O'DELL: Yes. 11 MR. ZELLERS: -- Counsel. 12 MS. O'DELL: Yes, you -- she has described 13 it to you three times or four times maybe. And so 14 she has -- 15 MR. ZELLERS: Counsel -- 16 MS. O'DELL: -- answered your question. 17 MR. ZELLERS: -- please don't coach the 18 witness. Just -- 19 MS. O'DELL: -- I'm not -- I'm not -- 20 MR. ZELLERS: -- object to form, if you 21 want to object to form. 22 MS. O'DELL: -- well, don't harass the 23 witness, which -- that's what I am -- 24 MR. ZELLERS: I'm not harassing the 25 witness.</p>	<p>1 Q You -- one of the studies you reviewed was 2 Langseth; is that right? 3 A Yes, it is. 4 Q Langseth reviewed the overall pooled odds 5 of cancer and found that there was an odds ratio of 6 1.35 across the studies; is that right? 7 A I'm going to look for it, but -- 8 Q Okay. I -- 9 A -- it sounds about right. 10 Q -- I will hand you Langseth. 11 A I have it. 12 Q If you take a look at page 359, 13 Figure 1 -- do you see that -- do you know Langseth? 14 A I do. 15 Q Langseth looks at the case-control 16 studies, both the population-based and the 17 hospital-based; is that right? 18 A He looked at the studies that had a -- he 19 had available when this was established a decade 20 ago, yes. 21 Q And -- and he lists out 20 case-control 22 studies, correct? 23 A 14? 24 Q I'm looking at the chart above Figure 1. 25 And you think there's only 14 studies there?</p>

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<p style="text-align: right;">Page 218</p> <p>1 A Oh, I apologize. I thought you were 2 talking about the population-based studies. 3 No. You're absolutely right. 20 studies. 4 Q And of those 20 studies, only ten have 5 statistical significance; is that right? 6 A The original studies with the sample size 7 they had, ten seemed to have difference than one. 8 Q Of the 20 studies -- the 20 case-control 9 studies that were available and were studied by 10 Langseth, only ten had statistically significant 11 results; is that right? 12 MS. O'DELL: Object to the form. 13 A Again, he is combining them together. But 14 in the original form when they were not combined, 15 there are ten in their original form that had 16 statistical differences than one. They could 17 exclude one. 18 Q (BY MR. ZELLERS) Half of the studies did 19 not have statistically significant results; is that 20 right? 21 A The original studies had wide confidence 22 intervals. And the original studies, before they 23 were combined, many of them overlapped one. 24 Q Is the answer yes to my question? 25 MS. O'DELL: She has answered your</p>	<p style="text-align: right;">Page 220</p> <p>1 a causal association between perineal use of talc 2 and ovarian cancer? 3 MS. O'DELL: Objection to form. 4 A The Langseth study is one review. And as 5 I describe in my report, it seems like a well-done 6 review, although it does not provide the kind of 7 details that I would hope it would provide given 8 sort of the stature of some of the people who were 9 involved in writing the report. 10 That being said, this systematic review 11 suggests that there's an association between 12 perineal talc exposure and ovarian cancer. 13 Q You -- 14 A By itself, I don't think it provides 15 enough data to have causality, but it provides good 16 evidence that there's an association. 17 Q You understand that your interpretation of 18 this study is different and broader than the 19 authors' interpretation of the data, correct? 20 MS. O'DELL: Object to the form. 21 A One of the author's conclusion that I 22 found quite compelling was in -- on page 358 in the 23 second paragraph -- in the second column -- 24 Q (BY MR. ZELLERS) Can you answer my 25 question?</p>
<p style="text-align: right;">Page 219</p> <p>1 question. 2 MR. ZELLERS: Well, I -- I don't know. I 3 haven't heard an answer. 4 MS. O'DELL: You have heard a complete 5 answer. 6 A You're asking me to look at the results in 7 Figure 1 -- 8 Q (BY MR. ZELLERS) Yes. 9 A -- which are meant to combine results. 10 But they also had the individual original study 11 sample size and show that about half of them overlap 12 one. 13 Q Half is no better than a coin toss, 14 correct? 15 MS. O'DELL: Object to the form. 16 A It's an interesting question. But if 17 you're looking for something, is there an 18 association with an exposure with cancer, a random 19 selection of that, you would expect to find very few 20 positive associations. 21 To find half is an enormous association to 22 find from random studies if there was no 23 association. 24 Q (BY MR. ZELLERS) Do you believe that based 25 upon the Langseth paper and analysis, that there is</p>	<p style="text-align: right;">Page 221</p> <p>1 MS. O'DELL: She has answered your 2 question. Don't -- 3 MR. ZELLERS: Well, I don't think she is 4 answering my question. 5 A I think you are asking me about what the 6 authors conclude. 7 Q (BY MR. ZELLERS) I asked if your 8 conclusion was broader than the authors' -- 9 MS. O'DELL: And she is telling you what 10 the authors' conclusions are. You may finish, 11 Doctor. 12 A What -- what Langseth says is that, Eight 13 of the population-based case-control studies were 14 identified by the Arforthinger (phonetic) as being 15 the most informative in terms of the size of the 16 studies, whether the studies were population-based 17 participation rates and adjustment for confounding 18 variables. These selected studies -- among these 19 eight studies, the prevalence of use of talc was 16 20 to -- 21 THE COURT REPORTER: I can't hear. 22 A -- sorry. The selected studies included 23 at least 188 cases and had participation rates 24 ranging up to 75 percent. Among these eight 25 studies, the prevalence of peritoneal use of</p>

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<p>1 talc-based body powder among controls ranged from 16 2 to 52 percent. 3 The relative risk of ovarian cancer among 4 body powder users were homogeneous across the set of 5 eight studies, each of which indicated a 30 to 6 60 percent increase in risk. 7 Among the other 12 case-control studies, 8 most also reported relative risk of this magnitude 9 or higher. 10 So I think the authors of this concluded 11 that the better studies showed a very strong 12 association. And -- and I -- I'm not sure what 13 conclusion of the authors you're asking me to 14 disagree with. 15 Q (BY MR. ZELLERS) Okay. Doctor, take a 16 look at "Proposal to Research Community" on the 17 right-hand side of page 359. 18 Do you see that? 19 A I do. 20 Q I'm going to read this, and you tell me if 21 I read it correctly. 22 "The current body of experimental and 23 epidemiological evidence is insufficient to 24 establish a causal association between perineal use 25 of talc and ovarian cancer risk.</p>	<p>1 as nonresponsive. 2 My question was: Did I read that 3 correctly? 4 A You read that text correctly. 5 Q All right. You conclude in your report 6 with respect to strength of association that because 7 a very large number of ovarian cancers are caused by 8 talcum powder and talcum powder provides no 9 better -- no medical benefit, the Hill criterion of 10 strength of association is important and met. 11 Is that right? 12 A I don't think that's exactly right. I -- 13 I think all of the things I believe are in there 14 somewhere, but that's not quite what I would be -- 15 Q I -- 16 A -- report. 17 Q -- I'm just reading from page 38 of your 18 report. Do you believe that because a very large 19 number of ovarian cancers are caused by talcum 20 powder and talcum powder provides no medical 21 benefit, the Hill criterion of strength of 22 association is important and is met? 23 MS. O'DELL: Object to the form. I don't 24 think you read that -- 25 A I --</p>
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<p>1 Experimental research is needed to better 2 characterize deposition, retention, and clearance of 3 talc to evaluate the ovarian carcinogenicity of 4 talc." 5 Did I read that correctly? 6 A Not only did you read that correctly, I 7 would agree with that based on data available in 8 2008. 9 So you asked me if I thought this study by 10 itself evaluated causality. 11 And this study did not discuss the 12 deposition, the retention, or clearance. And I 13 think those factors are crucial to understanding the 14 causality. 15 Q Okay. 16 A And that's new since -- 17 MR. ZELLERS: Move -- 18 A -- 2008. 19 MR. ZELLERS: -- to strike as not -- 20 MS. O'DELL: She is -- 21 MR. ZELLERS: -- she finished. 22 MS. O'DELL: -- she did not finish. 23 MR. ZELLERS: Did you finish? 24 A I was close enough. 25 MR. ZELLERS: All right. Move to strike</p>	<p>1 MS. O'DELL: -- the report correctly. But 2 if you were intending to read from her report 3 verbatim, I don't believe that was correct. 4 MR. ZELLERS: Counsel, please, just object 5 to form, if you do have an objection. 6 MS. O'DELL: I have an objection. 7 A Could you -- again, you -- the -- what I 8 believe has been -- within your statement, but 9 that's not the reason I believe that the Bradford 10 Hill criteria are met. 11 Q (BY MR. ZELLERS) Well, let me ask you a 12 question. 13 A Yes. 14 Q In your discussion of the Bradford Hill 15 criterion of strength of association, you include 16 Table 7, which is entitled "An Estimate of the 17 Number of Ovarian Cancers and Invasive Serous 18 Cancers Caused by Regular Use of Perineal Talc 19 Powder Products"; is that right? 20 A Yes. 21 Q Is that a calculation that you did to try 22 to determine whether or not there is strength of 23 association? 24 A No, but that's not why I included that. 25 Q Well, is it included in your "Strength of</p>

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<p style="text-align: right;">Page 226</p> <p>1 Association" section?</p> <p>2 A It is included in the strength of</p> <p>3 association to demonstrate how -- an odds ratio of</p> <p>4 1.5, how many patients could be impacted on that.</p> <p>5 So one of the questions is: Is there a</p> <p>6 strong association? And the second, which is really</p> <p>7 quite a different question, is: What's the</p> <p>8 magnitude of that association?</p> <p>9 And sometimes the magnitude of the</p> <p>10 association is mistakenly used as an approximation</p> <p>11 of the strength of the association.</p> <p>12 And I was trying to disentangle the</p> <p>13 strength of the association. How truly do we know</p> <p>14 they're associated with -- if it is associated, how</p> <p>15 big of an impact would it have?</p> <p>16 And so the purpose of Table 7 is not in</p> <p>17 any way to demonstrate the strengths of the</p> <p>18 association, which is a requirement to assess for</p> <p>19 Bradford Hill --</p> <p>20 Q Would your --</p> <p>21 MR. LAPINSKI: She's not finished --</p> <p>22 A -- but how many --</p> <p>23 MR. LAPINSKI: -- Counsel.</p> <p>24 A -- but --</p> <p>25 MR. ZELLERS: Okay. Counsel, one lawyer</p>	<p style="text-align: right;">Page 228</p> <p>1 fine.</p> <p>2 MR. ZELLERS: Please don't interrupt</p> <p>3 the --</p> <p>4 MS. O'DELL: That's --</p> <p>5 MR. ZELLERS: -- deposition.</p> <p>6 MR. LAPINSKI: -- better. Thank you.</p> <p>7 MR. ZELLERS: Ms. O'Dell is doing a</p> <p>8 fabulous job of making objections --</p> <p>9 MR. LAPINSKI: Yes, she is.</p> <p>10 MR. ZELLERS: -- for all of you.</p> <p>11 Q (BY MR. ZELLERS) Okay. Doctor. You were</p> <p>12 trying --</p> <p>13 MS. O'DELL: Excuse me. I don't -- still</p> <p>14 don't think she was finished.</p> <p>15 MR. ZELLERS: Okay.</p> <p>16 MS. O'DELL: So you may continue, Doctor.</p> <p>17 If you were finished, great. If you weren't, you</p> <p>18 may finish your answer.</p> <p>19 A I -- I'm going to have to say I -- I -- so</p> <p>20 the -- the -- Table 7 is an illustration of the</p> <p>21 number of women who would be impacted.</p> <p>22 And the point was to explain that the</p> <p>23 strength of the association is separate from the</p> <p>24 number of women impacted. But indeed, it</p> <p>25 illustrates how important the number of women</p>
<p style="text-align: right;">Page 227</p> <p>1 can object. Okay. I don't want all of you</p> <p>2 objecting.</p> <p>3 MR. LAPINSKI: Don't -- don't raise your</p> <p>4 voice to me.</p> <p>5 MR. ZELLERS: No. I don't want all of you</p> <p>6 objecting.</p> <p>7 MR. LAPINSKI: Counsel, if you want to</p> <p>8 make a statement --</p> <p>9 MR. ZELLERS: Yeah --</p> <p>10 MR. LAPINSKI: -- make a statement.</p> <p>11 MR. ZELLERS: -- I'm making a statement</p> <p>12 that I do not want --</p> <p>13 MR. LAPINSKI: That's --</p> <p>14 MR. ZELLERS: -- the whole group of</p> <p>15 lawyers --</p> <p>16 MR. LAPINSKI: -- and you --</p> <p>17 MR. ZELLERS: -- on the Plaintiffs' side</p> <p>18 objecting.</p> <p>19 MR. LAPINSKI: -- I'm sitting directly</p> <p>20 across the table from you. And I can hear you, and</p> <p>21 I have heard you all day.</p> <p>22 MR. ZELLERS: Okay.</p> <p>23 MR. LAPINSKI: I have heard you carry on</p> <p>24 the way you have carried on all day. There's no</p> <p>25 reason to raise your voice to me. I can hear you</p>	<p style="text-align: right;">Page 229</p> <p>1 impacted is.</p> <p>2 Q Let's go through your math.</p> <p>3 A Yes.</p> <p>4 Q So the table, Table 7, includes several</p> <p>5 assumptions; is that right?</p> <p>6 A A great number of assumptions.</p> <p>7 Q You ran the data, assuming that 10 percent</p> <p>8 of the female population in the United States used</p> <p>9 talcum powder products regularly, as you define</p> <p>10 "regularly"; is that right?</p> <p>11 A Just to clarify, I -- I demonstrated what</p> <p>12 the impact would be if we estimated the number of</p> <p>13 women at 10 percent.</p> <p>14 Q You did the same calculation for</p> <p>15 20 percent and 30 percent; is that right?</p> <p>16 A Yes, I did.</p> <p>17 Q You don't actually know what percentage of</p> <p>18 women use talcum powder products regularly --</p> <p>19 A I --</p> <p>20 Q -- correct?</p> <p>21 A -- I do not.</p> <p>22 Q All right. The calculation -- or your</p> <p>23 conclusion is that .14 percent of women exposed to</p> <p>24 talcum powder products have invasive serous cancer.</p> <p>25 And I am looking at your 10 percent assumption that</p>

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<p>1 you make. 2 Did you mean .14 or did you mean for that 3 to be 14 percent? 4 A So I -- I take your correction as a -- as 5 correct. 6 Q Okay. 7 A I do mean 14 percent, but -- but it's not 8 the way you have interpreted it. 9 The -- the -- the calculation -- the 10 columns are the percent of invasive cancer that is 11 attributable to talcum powder, not the proportion of 12 cancer -- the proportion of women exposed who will 13 develop cancer. Those are very different. 14 Q I'm not sure I understand. Your column 15 here says, The percent of invasive serous cancer in 16 women exposed to talcum powder products; is that 17 right? 18 A That is correct. 19 Q Okay. The universe of talcum powder 20 products, which you're estimating here -- and I 21 understand it's an estimation -- is 10 percent of 22 the population; is that right? 23 MS. O'DELL: Object to the form. 24 A I -- I -- I -- I'm estimating in this 25 table that 10 percent of women use talcum powder --</p>	<p>1 women get ovarian cancer. That would be five 2 million women. 3 I'm saying if we look at the world of 4 invasive serous cancers in the United States, there 5 will be in the ballpark of 11,000 serous cancers 6 every year in the United States. 7 Of those, 14 percent of those will occur 8 in regular users of talc powders. 86 percent will 9 occur in nonregular talc users. 10 So you're interpreting what is listed as a 11 column percent. It says, Percent of invasive serous 12 cancer in women exposed to talc products. 13 You're interpreting that as if I'm saying 14 that the women exposed, that 15 percent of them will 15 get ovarian cancer. 16 Q And in fact, if -- if your caption is 17 right, if we really are looking at the percent of 18 invasive serous cancer in women exposed to talcum 19 powder products, it would be less than .01 percent, 20 right? 21 A Um -- 22 MS. O'DELL: Object to the form. 23 A -- you -- you're asking me how many women 24 with exposure will end up getting? 25 Q (BY MR. ZELLERS) Yes.</p>
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<p>1 Q (BY MR. ZELLERS) Right. 2 A -- products in the U.S. 3 Q There are approximately -- what do you say 4 -- 30 -- 5 A 311 million. 6 Q -- all right. So 311 million. And you 7 are estimating for purposes of this exercise that 8 31,100,000 are regular users; is that right? 9 A Yes. 10 Q And what you are trying to determine is of 11 those 31,100,000, what percent of regular talc users 12 will have invasive serous cancer, correct? 13 A Yes. 14 Q And you have calculated 14 percent; is 15 that right? 16 A No. 17 Q It's wrong, right? 18 A The way you are describing it is wrong. 19 But I can give you an example to help you understand 20 that table. 21 Q Well -- 22 A The number of cancers, we're talking about 23 31 million women or women who were exposed to 24 cancers. 25 I'm not saying 13 -- 14 percent of those</p>	<p>1 A So that's a -- a good number. It's not 2 one I presented, but certainly one I can estimate, 3 which is -- if we're talking about 31 million women 4 who have regular exposure and of those who will 5 get -- I'm scribbling on my exhibit. I hope that's 6 okay. Is that okay? One, two, three -- one, two, 7 three. One -- one out of -- one out of 3,000 women 8 will get -- 9 Q So -- 10 A -- ovarian cancer. 11 Q -- approximately .01 percent, correct? 12 A That sounds pretty good, actually. 13 Q All right. Dose response. A significant 14 number of the talcum powder studies that you looked 15 at do not show a dose response or fail to account 16 for dose response altogether; is that right? 17 A In my summary of dose response on page 39, 18 I note that Penninkilampi, one of the large 19 meta-analyses, which I think is the most 20 comprehensive review, talks about dose response. 21 I didn't cite here -- and it was an 22 oversight -- Berge, another large comprehensive 23 meta-analysis, also shows dose response. 24 So the two systematic reviews showed dose 25 response. I also list Terry as showing dose</p>

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<p style="text-align: right;">Page 234</p> <p>1 response. That's the pool data of a large number of 2 studies. Those are, you know, both quite -- I -- I 3 have covered most of the publications, so those show 4 dose response. 5 There are a few others that I show. There 6 are definitely a bunch that do not address the issue 7 of dose response, but -- but I wouldn't characterize 8 it as most do not. 9 Q Well, you state on page 40 of your report 10 with respect to dose response, The results are 11 inconsistent and more importantly are not considered 12 or assessed in most of the published studies. 13 That was your conclusion with respect to 14 dose response; is that right? 15 A You are going to have to tell me where 16 you're reading. What I'm reading says, In summary, 17 most, but not all, studies of talcum powder products 18 in ovarian cancer show a dose response. 19 THE COURT REPORTER: Slow down when you 20 read, please. 21 A I'm so sorry. 22 In summary, most, but not all, studies of 23 talcum powder products in ovarian cancer show a dose 24 response. Most do. 25 But the results are inconsistent and more</p>	<p style="text-align: right;">Page 236</p> <p>1 A Yes. 2 Q Would you agree that generally when you 3 looked at the published studies, that they showed an 4 association of around 1.3 between perineal talc use 5 and ovarian cancer? 6 A I think many of the studies showed an 7 association of about 1.3 of any talc use. Not 8 quantifying the amount of exposure. 9 Q But would you agree that an -- that 10 epidemiologists generally consider a 1.3 odds ratio 11 in a case-control study to be a weak or modest 12 association? 13 MS. O'DELL: Object to the form. 14 A I am -- I am unaware what -- of what most 15 epidemiologists think. 16 Q (BY MR. ZELLERS) Have you seen any peer 17 reviewed literature on talc and ovarian cancer that 18 states that 1.3 is a strong association? 19 A I mean, Penninkilampi concludes there's a 20 consistent association between perineal talc -- talc 21 use and ovarian cancer. 22 And I'm just looking for how he quantifies 23 that. He concludes the results indicate that 24 perineal talc use is associated with a 24 to 25 39 percent increased risk of ovarian cancer.</p>
<p style="text-align: right;">Page 235</p> <p>1 importantly are not considered assessed in most -- 2 that -- that should not say "most." It should say 3 "in many of the published studies." 4 Q (BY MR. ZELLERS) All right. So you would 5 amend your report from "most" to "many; is that 6 right? 7 A I -- I used "most" twice in the same 8 sentence as meaning different things. So yes, I -- 9 Q Go -- 10 A -- it was an error. 11 Q -- Gertig 2000 study found that there was 12 no increase in risk of ovarian cancer with 13 increasing frequency of use; is that right? 14 A I would have to check that, but I'm happy 15 to do so. I believe that's correct. 16 Q Hunchcharek 2003 found that the data 17 showed a lack of clear dose response relationship, 18 making the relative risk of questionable validity; 19 is that right? 20 A Which -- which one? 21 Q Sure. Hunchcharek 2003, page 19 of 55. 22 A Wait. This one is 2011. I don't -- I 23 don't think I have that one. 24 Q All right. Consistency. Consistency is 25 another factor that you looked at; is that right?</p>	<p style="text-align: right;">Page 237</p> <p>1 He doesn't quantify it as weak or strong, 2 but there's a suggestion that a 39 percent increase 3 is important. But he -- he doesn't quantify it. So 4 I would have to look through the authors' 5 conclusions. 6 Q Do you know who Penninkilampi is? 7 A I do not. 8 Q Do you know that he is a medical student? 9 A I'm very impressed. He did a beautiful 10 review. 11 Q Do you know who Guy Eslick is, the other 12 author on that paper? 13 A I do not. 14 Q Do you know if he's an expert for the 15 Plaintiffs in the talc litigation? 16 A I -- I do not. 17 MS. O'DELL: Object to the form. 18 Q (BY MR. ZELLERS) Does Mr. Eslick disclose 19 or identify that he is working for or has worked for 20 Plaintiffs in the talc litigation? 21 A I might -- I don't know the answer to 22 that. 23 Q You would expect that if that was true, 24 that there would be a disclosure of that; is that 25 right?</p>

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<p>1 A I --</p> <p>2 MS. O'DELL: Object to the form.</p> <p>3 A -- it's published in a very high-impact,</p> <p>4 high-quality medical journal, and I would suspect</p> <p>5 that that would be required of that journal.</p> <p>6 But -- but I -- I -- I -- I don't -- I --</p> <p>7 I don't know that journal's requirements, but I</p> <p>8 would suspect that they would require reporting</p> <p>9 funding.</p> <p>10 Q You --</p> <p>11 A It says -- I'm sorry. It says, The</p> <p>12 authors report no conflicts of interest and have not</p> <p>13 reported funding.</p> <p>14 And typically when you have to reporting</p> <p>15 conflicts of interest in the same area, you also</p> <p>16 report funding, and I don't see any of that.</p> <p>17 Q The cohort studies. There are four cohort</p> <p>18 studies; is that right?</p> <p>19 A Yes.</p> <p>20 Q All right. You rely only on the Gertig</p> <p>21 study, the 2000 study; is that right --</p> <p>22 MS. O'DELL: Object to the form.</p> <p>23 Q (BY MR. ZELLERS) -- of those four?</p> <p>24 MS. O'DELL: Excuse me. Object to the</p> <p>25 form.</p>	<p>1 are summarized the way you summarized them. And I</p> <p>2 think if you look at them a little more closely, I</p> <p>3 would not make that conclusion. So --</p> <p>4 Q For the reasons set forth in your report?</p> <p>5 A It's in my report.</p> <p>6 MR. ZELLERS: All right. Let's take a</p> <p>7 break.</p> <p>8 THE VIDEOGRAPHER: We're off the record.</p> <p>9 The time is 3:58 p.m.</p> <p>10 (A break was taken from 3:58 p.m. to</p> <p>11 3:58 p.m.)</p> <p>12 (Next portion not on video record.)</p> <p>13 MR. ZELLERS: So we are back on the</p> <p>14 written record, but not the video record. My</p> <p>15 understanding is that, you know, we are taking a</p> <p>16 break as an accommodation to the witness, and that</p> <p>17 that's fine, but that, you know, you are not going</p> <p>18 to use this time to further meet and prepare the</p> <p>19 witness based upon the questions I asked today.</p> <p>20 MS. O'DELL: Correct. There's --</p> <p>21 there's -- Dr. Smith-Bindman is taking this break</p> <p>22 because she is still recovering from her concussion.</p> <p>23 There will be no meeting with</p> <p>24 Dr. Smith-Bindman. I do want to point out counsel</p> <p>25 for J&J seems to have dictated this requirement in</p>
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<p>1 A My report summarizes all four of them, and</p> <p>2 that all went into the weight of my report.</p> <p>3 In terms of being included in any</p> <p>4 systematic review, only one of them was included in</p> <p>5 the systematic review.</p> <p>6 Q (BY MR. ZELLERS) If you looked just at the</p> <p>7 cohort studies --</p> <p>8 A Yes.</p> <p>9 Q -- you would not find a statistically</p> <p>10 significant association between perineal talc use</p> <p>11 and ovarian cancer, correct?</p> <p>12 MS. O'DELL: Object to the form.</p> <p>13 A I --</p> <p>14 MS. O'DELL: Excuse me. When -- when you</p> <p>15 get to a good stopping point, it would be good to</p> <p>16 take a break --</p> <p>17 MR. ZELLERS: Okay.</p> <p>18 MS. O'DELL: -- but whenever you're -- if</p> <p>19 you have a few more minutes, that's fine, but</p> <p>20 whenever you get to a good point.</p> <p>21 A -- so I summarize my view of the cohort</p> <p>22 studies, which are not exactly what you -- what you</p> <p>23 just summarized -- the way you just summarized them</p> <p>24 on page 21.</p> <p>25 So I think that often the cohort studies</p>	<p>1 order to accommodate the witness's situation.</p> <p>2 But I would just note the deposition</p> <p>3 protocol has no such restriction, and -- and so</p> <p>4 that -- to that degree, I would say we have no</p> <p>5 intent to prepare the witness any further.</p> <p>6 But we're not restricted from talking to</p> <p>7 the witness, and I don't want the record to suggest</p> <p>8 otherwise.</p> <p>9 MR. ZELLERS: We will see you tomorrow.</p> <p>10 MS. O'DELL: Thank you.</p> <p>11 THE VIDEOGRAPHER: We are back on the</p> <p>12 record at 4:01 p.m, and this is the end of Disc</p> <p>13 No. 4 in today's testimony of Dr. Rebecca</p> <p>14 Smith-Bindman. The time is 4:01 p.m.</p> <p>15</p> <p>16 (TIME NOTED: 4:01 p.m.)</p> <p>17</p> <p>18</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p>

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1	1 ERRATA SHEET
2	2 Golkow Litigation Services
3	3 1650 Market Street, One Liberty Plaza, 51st Floor
4 I, REBECCA SMITH-BINDMAN, M.D., VOLUME I, do	4 Philadelphia, Pennsylvania 19103
5 hereby declare under penalty of perjury that I have	5 877-370-3377
6 read the foregoing transcript; that I have made any	6 CASE: Talcum Powder Litigation
7 corrections as appear noted, in ink, initialed by	7 PAGE LINE FROM TO
8 me, or attached hereto; that my testimony as	8
9 contained herein, as corrected, is true and correct.	9
10 EXECUTED this _____ day of _____,	10
11 20____, at _____,	11
(City) (State)	12
12	13
13	14
14 _____	15
REBECCA SMITH-BINDMAN, M.D.	16
VOLUME I	17
15	18
16	19
17	20
18	21 _____
19	22 REBECCA SMITH-BINDMAN, M.D., VOLUME I
20	23 Subscribed and sworn to before me
21	24 this ____ day of _____, 2019.
22	25 _____
23	Notary Public
24	
25	

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1 I, MARY J. GOFF, CSR No. 13427, Certified
2 Shorthand Reporter of the State of California,
3 certify;
4 That the foregoing proceedings were taken
5 before me at the time and place herein set forth, at
6 which time the witness declared under penalty of
7 perjury; that the testimony of the witness and all
8 objections made at the time of the examination were
9 recorded stenographically by me and were thereafter
10 transcribed under my direction and supervision; that
11 the foregoing is a full, true, and correct
12 transcript of my shorthand notes so taken and of the
13 testimony so given;
14 That before completion of the deposition,
15 review of the transcript () was (XX) was not
16 requested: () that the witness has failed or
17 refused to approve the transcript.
18 I further certify that I am not financially
19 interested in the action, and I am not a relative or
20 employee of any attorney of the parties, nor of any
21 of the parties.
22 I declare under penalty of perjury under the
23 laws of California that the foregoing is true and
24 correct, dated this ____ day of _____, 2019.
25 MARY J. GOFF

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IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF NEW JERSEY

IN RE: JOHNSON & JOHNSON TALCUM
POWDER PRODUCTS MARKETING, SALES
PRACTICES, AND PRODUCTS LIABILITY
LITIGATION

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)
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)
) MDL No.
) 2738 (FLW)(LHG)
)
)

VIDEOTAPED DEPOSITION OF
REBECCA SMITH-BINDMAN, M.D.
San Francisco, California
Friday, February 8, 2019
Volume II

Reported by:
MARY J. GOFF
CSR No. 13427

Rebecca Smith-Bindman, M.D.

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<p>1 2 3 4 5 Videotaped Deposition of REBECCA 6 SMITH-BINDMAN, M.D., Volume II, taken on behalf of 7 Johnson & Johnson, at Levin Simes Abrams LLP, 8 1700 Montgomery Street, Suite 250, San Francisco, 9 California 94111, beginning at 9:26 a.m. and ending 10 at 12:48 p.m., on February 8, 2019, before MARY J. 11 GOFF, California Certified Shorthand Reporter No. 12 13427. 13 14 15 16 17 18 19 20 21 22 23 24 25</p>	<p>1 APPEARANCES (continued): 2 3 For Defendant Johnson & Johnson 4 Tucker Ellis LLP 5 BY: MICHAEL C. ZELLERS 6 Attorney at Law 7 515 South Flower Street 8 42nd Floor 9 Los Angeles, California 90071 10 michael.zellers@tuckerellis.com 11 213-430-3301 12 13 14 For Defendant Johnson & Johnson 15 Skadden, Arps, Slate, Meagher & Flom, LLP. 16 BY: BENJAMIN HALPERIN 17 Attorney at Law 18 4 Times Square 19 New York, New York 10036 20 benjamin.halperin@skadden.com 21 212-735-2453 22 23 24 25</p>
Page 247	Page 249
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1	APPEARANCES (continued):	1	EXHIBITS CONTINUED: PAGE
2	For Defendant PCPC, Personal Care Products Council	2	Exhibit 34 Does Exposure to Asbestos Cause Ovarian Cancer article 324
3	Seyfarth Shaw, LLP	3	
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24	Andrew Graves	24	
25		25	

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4	Volume II	4	
5		5	THE VIDEOGRAPHER: We are now on the
6	BY MR. ZELLERS 254, 372	6	record. My name is Andrew Graves. I'm a
7	BY MS. O'DELL 354	7	videographer for Golkow Litigation Services.
8	BY MR. BILLINGS-KANG 347	8	Today's date is February 8, 2019. The time is
9	BY MS. BOCKUS 331, 369	9	9:26 a.m.
10		10	This video deposition is being held at
11	NUMBER DESCRIPTION PAGE	11	1700 Montgomery Street, Suite 250, San Francisco,
12	Exhibit 28 6/1/17 Letter, Invoice 259	12	California, In the Matter of In Re: Johnson &
13		13	Johnson Talcum Powder Products Marketing, Sales
14	Exhibit 29 Bill, Invoice 147 261	14	Practices, and Products Liability Litigation, for
15		15	the United States District Court, District of
16		16	New Jersey.
17	Exhibit 30 Perineal Use of Talc and Risk of Ovarian Cancer article 276	17	The deponent is Rebecca Smith-Bindman,
18		18	Ph.D., Volume II.
19		19	Would counsel please identify yourselves.
20	Exhibit 31 Influence of Aspirin and nonaspirin NSAID Use article 297	20	MR. ZELLERS: Can we waive that since we
21		21	were all here yesterday?
22	Exhibit 32 Article, Talc 317	22	THE VIDEOGRAPHER: Okay. The court
23		23	reporter is Mary Goff, and she will now swear in the
24	Exhibit 33 Invoice, Tachibana, UCSF, 10/18 319	24	witness.
25		25	

3 (Pages 250 to 253)

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<p>1 REBECCA SMITH-BINDMAN, M.D., VOLUME II, 2 being first duly sworn or affirmed to testify to the 3 truth, the whole truth, and nothing but the truth, 4 was examined and testified as follows: 5 EXAMINATION BY COUNSEL FOR THE DEFENDANTS 6 BY MR. ZELLERS: 7 Q Good morning. 8 A Good morning. 9 Q Dr. Smith-Bindman, did you do anything to 10 prepare -- or further prepare for your deposition 11 since the time we concluded yesterday and this 12 morning? 13 A I did two things. I reviewed my report 14 again, and I called the biostatistician who worked 15 on my meta-analysis to review a few of the details. 16 Q You called Dr. Hall? 17 A I did. 18 Q When was the last time that you had talked 19 with Dr. Hall before yesterday? 20 A Speaking to her at the time of -- that she 21 did the analysis. And I -- I think there was an 22 e-mail or two over the last several weeks asking for 23 her CV or something like that, but not any 24 meaningful conversation. 25 Q Have you produced the e-mails -- the</p>	<p>1 manuscript. 2 I was quite surprised that they weren't 3 exactly the same. They were not meaningfully 4 different, but there was a very slight shift in 5 the ones that are in my report. 6 I mean, I asked Dr. Jane why that was the 7 case. And in fact, the numbers are calculated using 8 the standard errors in the confidence intervals and 9 the sample size which very slightly shifts it from 10 the reported numbers. 11 So you were correct when you said the 12 numbers are not exactly the same, and she explained 13 that that's why that's the case. 14 Q Are the numbers that were contained in 15 Figure -- Figures 2 and 3 in your report, estimates? 16 MS. O'DELL: Object to the form. 17 A The numbers are calculated. So I -- I 18 think by that, you mean estimates. 19 Q (BY MR. ZELLERS) Did you do the 20 calculations? 21 A No. She -- she did them. 22 Q Do we -- 23 THE COURT REPORTER: Can you raise your 24 voice for me, please? 25 A Yes, I can. I apologize.</p>
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<p>1 recent e-mails with Dr. Hall? 2 A I -- I'm not sure if I produced the one 3 asking for her CV, but the -- and actually, I don't 4 remember when I asked her for that. I might have 5 presented -- 6 MS. O'DELL: I think that's part of the 7 production -- 8 Q (BY MR. ZELLERS) How -- 9 MS. O'DELL: -- but -- excuse me. 10 Q (BY MR. ZELLERS) How long did you speak 11 with Dr. Hall yesterday? 12 A About 15 -- 10-15 minutes. 13 Q Did you make any written notes? 14 A I -- I think I scribbled in my usual 15 scribble place. 16 Q What notes did you make from your 17 conversation with Dr. Hall yesterday after the first 18 session of your deposition? 19 A So -- so I did -- I did -- I did jot some 20 notes on my meta-analysis. But mostly I asked her 21 to clarify how she did the calculations of the 22 numbers that are shown in the figures. 23 I was struggling to understand why the 24 numbers and the figures were not exactly the same as 25 the ones that you showed me in the published</p>	<p>1 Q (BY MR. ZELLERS) Do we have her work 2 product as to the calculations that were made? 3 A In the documents that I shared, she 4 specified the -- the software that she used, the 5 program that she used. 6 In fact, the way of estimating it, it's 7 actually in my report as well. And so yes, it's 8 explained there, and it's in all of the documents 9 that I shared with you. 10 Q Her calculations are contained in the 11 documents that are shared; is that right? 12 A Yes. 13 Q The numbers that you got from the Terry 14 study, those came from the Terry publication; is 15 that right? 16 A Yes. 17 Q Any additional notes you made from your 18 discussion with Dr. Hall, other than what you have 19 generally told us about? 20 A No. Just that. 21 Q The notes that you added to your annotated 22 report from your discussion with Dr. Hall, which we 23 marked as Exhibit 17, those notes are on which page 24 or pages? 25 A Page 33 and 34.</p>

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<p>1 Q It looks like you made those notes in an 2 aqua pen is -- is that right, or -- 3 A Yes. 4 Q -- I -- 5 A Yes. 6 Q Okay. 7 A Yes, absolutely. 8 Q Any -- 9 A I would say teal, but... 10 Q Well, I think you're probably more correct 11 than I am. 12 Any other notes that you had from your 13 discussion with Dr. Hall? 14 A No. 15 Q Any other communications that you had with 16 Dr. Hall, other than your 10- or 15-minute phone 17 conversation yesterday afternoon or evening? 18 A No. 19 Q Did you communicate with Dr. Hall via 20 e-mail or any way other than just the phone call? 21 A No. 22 Q Did you communicate with anyone else 23 between the time we finished yesterday and this 24 morning about the subject matter that we're here to 25 talk about?</p>	<p>1 Q What do you -- well, I will take that as a 2 yes, that at least through November 13, 2018, that 3 Deposition Exhibit 28 are all of your invoices -- 4 A Yeah. 5 Q -- is that right? 6 A Yes. 7 Q Those invoices total approximately 8 160 hours. Does that sound right? 9 A 160? 10 Q 160. 11 A I'm -- I'm going to believe you. 12 Q Well, and anyone can go and check my math. 13 How many hours do you estimate that you 14 have spent up until today on this matter both doing 15 additional work, reviewing those additional studies 16 and materials we talked about yesterday, preparing 17 for the deposition, meeting with counsel for 18 Plaintiffs? 19 MS. O'DELL: Since the last invoice? 20 MR. ZELLERS: Since the last invoice is 21 what I had intended to ask. 22 MS. O'DELL: Yeah. Thank you. 23 A I -- I think approximately 25 hours. 24 Q (BY MR. ZELLERS) In addition, we were 25 provided with a two-page exhibit which are two</p>
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<p>1 A No. 2 Q At the start of the session today, counsel 3 for Plaintiffs, Ms. O'Dell, provided me with copies 4 of your invoices. 5 I'm going to hand you what we have marked 6 as Exhibit 28. It is a five-page exhibit. 7 The first page is a cover letter. It 8 looks like an engagement or general engagement 9 letter from you to -- you say Mr. Carmen Scott. 10 Is it a Ms. Carmen Scott? 11 (Exhibit 28 was marked for identification 12 and is attached to the transcript.) 13 A It is. 14 Q All right. That was on June 1 of 2017. 15 The last invoice is November 13 of 2018; is that 16 right? 17 A I'm sorry. What was the question? Is 18 this -- 19 Q The question is: Are those all of our 20 invoices that you have generated thus far in the 21 talcum powder MDL litigation? 22 A I -- I think I mentioned that there are -- 23 I haven't submitted anything beyond this, but that 24 there are additional hours that I recorded after 25 this.</p>	<p>1 invoices from Jane Hall, which total around \$3,000. 2 (Exhibit 29 was marked for identification 3 and is attached to the transcript.) 4 Q (BY MR. ZELLERS) Can you look at 5 Exhibit 29 and verify for us that those are the 6 e-mails -- strike that -- that those are the 7 invoices for the work that was done by Dr. Hall? 8 A I -- I -- I believe so. 9 Q Are you aware of any additional invoices 10 beyond that? 11 A I'm not. 12 Q Do you have any invoices from your copy 13 editor, Ms. Tachibana? 14 A She sent me an invoice, which I forwarded 15 to counsel. 16 Q All right. How much was that invoice for? 17 A I think it was about \$1,500. 18 Q How much an hour does Ms. Tachibana 19 charge? 20 A I think it's about a hundred dollars an 21 hour. 22 Q Was that for all of the work that she did 23 with respect to your report? 24 A Yes. There was no other work other than 25 that 15 -- it might have been \$1,700.</p>

5 (Pages 258 to 261)

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<p>1 MS. O'DELL: Excuse me. I'm sorry, Mike. 2 I apologize for not copying that. We're going to 3 make a copy, and I will provide it to your 4 momentarily at -- 5 MR. ZELLERS: Very good. We'll mark it 6 before the conclusion of the deposition. Thank you. 7 Q (BY MR. ZELLERS) Do you have your report 8 in front of you? You can use your annotated 9 version, No. -- Exhibit 17. We also marked your 10 report as Exhibit 2. 11 A Yes. 12 Q Do you have that in front of you? 13 A I do. 14 Q Go to page 17, if you will, please. 15 MR. LAPINSKI: Counsel, you said page 17? 16 MR. ZELLERS: Yes, page 17. 17 A Yes. 18 Q (BY MR. ZELLERS) On page 17, you make a 19 number of general statements about the advantages 20 and disadvantages of case control and cohort 21 studies; is that right? 22 A Yes. 23 Q There are no citations there. Is this 24 based and those statements based on your general 25 knowledge?</p>	<p>1 paragraph, Mike? I have lost track. 2 MR. ZELLERS: I was asking about the 3 specific statement in the middle paragraph of 4 page 17 relating to cohort studies and the 5 limitation that they rarely focus on a single 6 narrowly defined question. 7 MS. O'DELL: Yes. Thank you. 8 Q (BY MR. ZELLERS) But my question now is -- 9 A Yes. 10 Q -- whether or not Dr. Smith-Bindman, as 11 you sit here, can cite any published literature that 12 states the cohort studies are unlikely to detect a 13 real association -- or unlikely to detect real 14 associations for this reason. 15 A I -- 16 MS. O'DELL: Excuse me. Are you 17 quoting -- when you say "unlikely to detect real 18 associations for this reason," is that reading -- 19 are you reading from her report or is that just -- 20 MR. ZELLERS: No. That's my question. 21 MS. O'DELL: -- okay. Sorry. 22 MR. ZELLERS: And if it's not very 23 articulate -- 24 A I -- I think cohort -- cohort studies are 25 able to detect real associations, if they ask about</p>
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<p>1 A Yes. This is based on Epi 101, sort of... 2 Q You make a statement in the middle 3 paragraph on page 17 where you talk about "cohort 4 studies." 5 And you state that they rarely focus on a 6 single narrowly defined question and that that's an 7 important limitation of cohort studies. 8 Do you see that? 9 A I do. 10 Q Can you cite to any other epidemiologists 11 who agree with you on that point? 12 A So it's very well known the cost of doing 13 a cohort study is often very large, and so the topic 14 that's often the central focus of the cohort study 15 is very, very well done. 16 It's the ancillary topics that often get 17 short shrift. And so that -- I -- I could probably 18 find this explained in any basic textbook. 19 And -- and I -- I apologize for not citing 20 it. This is sort of just very well-known general 21 concepts of study design. 22 Q Can you cite to any published literature 23 that states that cohort studies are unlikely to 24 detect real associations for this reason? 25 MS. O'DELL: Are you reading a particular</p>	<p>1 those associations. 2 If they don't ask about it, then it 3 can't -- then -- then it doesn't have an ability to 4 measure it. 5 So what I am saying here is that cohort 6 studies don't have the capacity to go in depth and 7 ask. 8 I think all of the cohort studies that I 9 reviewed for -- for this review discuss the lack of 10 detail in the cohort question, meaning that it's not 11 that the study design was the problem. It was that 12 they just didn't have the right predictor 13 information being assessed. 14 Q Despite this limitation -- or in your 15 view, limitation of cohort studies, you did include 16 the Gertig 2000 cohort study in your systematic 17 review; is that right? 18 A I did. I just want to clarify the answer. 19 Cohort studies are a very strong study design that I 20 like very much and that I have used and currently 21 I'm -- I'm using in study designs. 22 It's rather if the study design uses a 23 cohort, which is a good design, doesn't have enough 24 detail, because that's not the focus, that 25 doesn't -- it can't be used to answer other</p>

6 (Pages 262 to 265)

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<p>1 questions easily.</p> <p>2 So I think in general I like cohort</p> <p>3 designs very much, and I think it's a very powerful</p> <p>4 study design. But if you haven't asked the right</p> <p>5 questions, it's hard to the expand it.</p> <p>6 So I did -- I read all of the cohorts on</p> <p>7 this topic.</p> <p>8 Q And you concluded that the Gertig cohort</p> <p>9 study, you know, asked the right information or had</p> <p>10 sufficient information for you to include it both in</p> <p>11 your general systematic review and in your more</p> <p>12 focused systematic review which you set forth as</p> <p>13 Figures 2 and 3 in your report, correct?</p> <p>14 A That's correct. That -- those -- those</p> <p>15 were looking at regular use, and I thought the</p> <p>16 Gertig was the cohort that allowed me to understand</p> <p>17 regular use of perineal talc.</p> <p>18 Q Gertig was based on the Nurses' Health</p> <p>19 Study; is that right?</p> <p>20 A Yes.</p> <p>21 Q Gertig and the authors do recognize that</p> <p>22 the biologic evidence for the association of talc</p> <p>23 and ovarian cancer is incomplete, correct?</p> <p>24 MS. O'DELL: Object to the form.</p> <p>25 A I -- I don't have it in front of me, but</p>	<p>1 yet they didn't report it that way.</p> <p>2 They only reported on any exposure to talc</p> <p>3 powder products. And that is a very vague</p> <p>4 definition as opposed to the frequency of use.</p> <p>5 And for that reason, I couldn't tell in --</p> <p>6 in nearly the same detail as I could for the earlier</p> <p>7 study, the -- the exposure. They just chose not to</p> <p>8 present it that way.</p> <p>9 Q The Gates 2010 cohort study did include</p> <p>10 over a hundred thousand women; is that right?</p> <p>11 A The Gates?</p> <p>12 Q Yes.</p> <p>13 A It was large, but I need to check the</p> <p>14 actual numbers.</p> <p>15 Q Here. Let me hand it to --</p> <p>16 A I have it. I have it.</p> <p>17 Q Do you have it?</p> <p>18 A Yeah.</p> <p>19 Q Okay. And I am looking at page 47. And</p> <p>20 it's quoting the Nurses' Health Study as involving</p> <p>21 close to 109,000 --</p> <p>22 A I'm not sure.</p> <p>23 Q -- women?</p> <p>24 A I'm not sure. I'm looking at the -- the</p> <p>25 Gates -- are you asking about Gates or Gertig?</p>
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<p>1 it may be that they reported as of 2000, they didn't</p> <p>2 have evidence of the biologic mechanism. I --</p> <p>3 Q And I will ask you about biologic</p> <p>4 mechanism before we conclude here today.</p> <p>5 You did not, though -- well, let me</p> <p>6 withdraw that.</p> <p>7 There was a follow-up cohort study to</p> <p>8 Gertig 2000, and that was the Gates 2010 cohort</p> <p>9 study; is that right?</p> <p>10 A Yes.</p> <p>11 Q That had a longer follow-up than Gertig;</p> <p>12 is that right?</p> <p>13 A Yes.</p> <p>14 Q It was an analysis of the data collected</p> <p>15 in the Nurses' Health Study; is that right?</p> <p>16 MS. O'DELL: Object to the form.</p> <p>17 A It was analysis of some of the data</p> <p>18 collected in the -- in the Nurses' Health Study, but</p> <p>19 they did not report the variable in such a way that</p> <p>20 would allow you to understand or to quantify the</p> <p>21 exposure as opposed to the first cohort study which</p> <p>22 did.</p> <p>23 So the latter study, they -- they had the</p> <p>24 data, which is why I'm answering it this way. They</p> <p>25 clearly had it, because the data hadn't change, and</p>	<p>1 Q I'm asking about Gates 2010.</p> <p>2 A In mine it says \$221,000 woman with 924</p> <p>3 epithelial ovarian cancer.</p> <p>4 Am I looking in the wrong place?</p> <p>5 Q No. I -- and then if you look further, it</p> <p>6 talks about -- at least in the Nurses' Health Study,</p> <p>7 there being 108,870 women; is that right?</p> <p>8 A Yes.</p> <p>9 Q The women in the national health study,</p> <p>10 which was the basis for both the Gertig 2000 cohort</p> <p>11 study and Gates 2010 cohort study, those women were</p> <p>12 followed from 1976 to 2006, so for 30 years --</p> <p>13 A Yes.</p> <p>14 Q -- is that right?</p> <p>15 A Yes.</p> <p>16 Q And -- and after following these hundred</p> <p>17 thousand women -- or over hundred thousand women for</p> <p>18 three decades, the authors in Gates 2010 concluded</p> <p>19 that the data did not show a statistically</p> <p>20 significant relationship between talcum powder use</p> <p>21 and any type of epithelial ovarian cancer; is -- is</p> <p>22 that right?</p> <p>23 A The Gates authors concluded that there was</p> <p>24 no association between any talcum powder product</p> <p>25 use, and it was not significant in ovarian cancer,</p>

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<p>1 yes.</p> <p>2 Q Another short study that you did not</p> <p>3 include in your systematic review was the Houghton</p> <p>4 study; is that right?</p> <p>5 MS. O'DELL: Object to form.</p> <p>6 A Yes, that is true.</p> <p>7 Q (BY MR. ZELLERS) The Houghton study was</p> <p>8 based on -- or is also called the Women's Health</p> <p>9 Initiative Study; is that right?</p> <p>10 A Yes, it is.</p> <p>11 Q That involved 61,000 women; is that right?</p> <p>12 A That is correct.</p> <p>13 Q Houghton 2014 did not find a statistically</p> <p>14 significant relationship between perineal talc use</p> <p>15 and ovarian cancer among women who had ever used</p> <p>16 talc; is that right?</p> <p>17 A That is what they concluded.</p> <p>18 Q Or among women who had fewer than nine</p> <p>19 years of perineal talc use, correct?</p> <p>20 A Correct.</p> <p>21 Q Or among women who had more than 10 years</p> <p>22 of perineal talc use, correct?</p> <p>23 A Can you say that last part?</p> <p>24 Q Sure.</p> <p>25 A Sorry.</p>	<p>1 using it on a -- on a frequent basis, so I think the</p> <p>2 duration is very different measure.</p> <p>3 Q We talked yesterday about your definition</p> <p>4 of "regular use," and you pointed me to your report</p> <p>5 where you give an extensive discussion of that.</p> <p>6 Do you remember?</p> <p>7 A I do.</p> <p>8 Q Did -- your definition of "regular use,"</p> <p>9 was that every psychometrically tested to</p> <p>10 demonstrate any validity or reliability?</p> <p>11 MS. O'DELL: Object to the form.</p> <p>12 A Of -- are you asking about the reliability</p> <p>13 of the way we defined it --</p> <p>14 Q (BY MR. ZELLERS) Yes.</p> <p>15 A -- or about the concept?</p> <p>16 Q No. About the way you defined it.</p> <p>17 A I believe we explained in the report that</p> <p>18 we tried to approximate regular use, frequency use</p> <p>19 by being at least three times a week and as close to</p> <p>20 daily as possible.</p> <p>21 But in terms of -- if that is -- I -- I'm</p> <p>22 not -- we have not validated that in different</p> <p>23 studies or --</p> <p>24 Q That's something that you came up with; is</p> <p>25 that right?</p>
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<p>1 Q Houghton 2014, that cohort study --</p> <p>2 A Okay. No. I -- yes, that is correct.</p> <p>3 Q And also, they did not find a</p> <p>4 statistically significant relationship between</p> <p>5 perineal talc use -- strike that.</p> <p>6 They also did not find a statistically</p> <p>7 significant relationship between the use of talcum</p> <p>8 powder on sanitary napkins or diaphragms on -- and</p> <p>9 ovarian cancer; is that right?</p> <p>10 A That's correct.</p> <p>11 Q Houghton does report on duration of use at</p> <p>12 least more than 10 years of use; is that right?</p> <p>13 A Yes.</p> <p>14 Q But would you consider women who use</p> <p>15 talcum powder for more than 10 years to be frequent</p> <p>16 talc users?</p> <p>17 MS. O'DELL: Object to the form.</p> <p>18 A So you're asking if duration of use can be</p> <p>19 equated with frequency of use, and -- and I would</p> <p>20 very strongly disagree that those are equivalent.</p> <p>21 And that is the primary reason that I</p> <p>22 discount the results of the Gonzalez and Houghton</p> <p>23 and Gates studies.</p> <p>24 Because frequency of use, meaning to use</p> <p>25 it once a month or once a year, is not the same as</p>	<p>1 A Yeah.</p> <p>2 MS. O'DELL: Object to the form.</p> <p>3 A Yes, it is.</p> <p>4 Q (BY MR. ZELLERS) Gonzalez. You criticize</p> <p>5 Gonzalez in your report for combining various types</p> <p>6 of use. Do you recall that generally? So that's</p> <p>7 page 21 where --</p> <p>8 A No. I'm -- I'm on my report. My -- my</p> <p>9 hesitation is it's not so much that I'm criticizing</p> <p>10 the study. It's rather it doesn't contribute to</p> <p>11 answering the question that I was asking, which was:</p> <p>12 Does regular perineal talc exposure increase the</p> <p>13 risk?</p> <p>14 It doesn't mean that the questions they</p> <p>15 have asked are not interesting questions. They were</p> <p>16 just not the ones I was focusing on.</p> <p>17 Q Why would combining various types of use,</p> <p>18 bias the results in favor of not detecting an</p> <p>19 association?</p> <p>20 I guess from your statement it -- it may</p> <p>21 well not bias the results; is that right? It just</p> <p>22 was just a different question --</p> <p>23 A It's just a different question.</p> <p>24 Q -- than what --</p> <p>25 A I --</p>

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<p>1 Q -- you were looking at?</p> <p>2 A -- I believe that you want to have as</p> <p>3 narrow a definition, in my belief, of meta-analysis</p> <p>4 as possible to understand when you're pooling</p> <p>5 results, make sure -- something you said -- you're</p> <p>6 combining apples to apples.</p> <p>7 And I think one would expect that any</p> <p>8 potential -- potential exposure to talcum powder</p> <p>9 would matter what skin or surface or cell line or</p> <p>10 tissue you're putting against, and you wouldn't</p> <p>11 necessarily expect the same result in a cervical</p> <p>12 exposure or a diaphragm exposure or a vaginal</p> <p>13 exposure.</p> <p>14 You -- you might have an association of</p> <p>15 those places. You might not. I just think it's a</p> <p>16 different question.</p> <p>17 Q All of the cohort studies were prospective</p> <p>18 as opposed to retrospective; is that right?</p> <p>19 A Yes.</p> <p>20 Q Prospective studies are not subject to</p> <p>21 recall bias like retrospective studies, correct?</p> <p>22 A Yes, that's true.</p> <p>23 Q They're also not subject to the same</p> <p>24 selection bias as retrospective studies, correct?</p> <p>25 MS. O'DELL: Object to the form.</p>	<p>1 absolutely that's a possibility.</p> <p>2 Q You also looked at both the hospital-based</p> <p>3 and the population-based case-control studies; is</p> <p>4 that right?</p> <p>5 A I did.</p> <p>6 Q None of the hospital-based case-control</p> <p>7 studies show a statistically significant association</p> <p>8 between talc use and ovarian cancer, correct?</p> <p>9 A I -- I'm not sure --</p> <p>10 Q Take a look at --</p> <p>11 A -- where you're getting that from.</p> <p>12 Q I will show you the Langseth paper from</p> <p>13 2008, which you cite and we talked about yesterday.</p> <p>14 Let's mark this as Exhibit 30.</p> <p>15 (Exhibit 30 was marked for identification</p> <p>16 and is attached to the transcript.)</p> <p>17 A I have it. I have it.</p> <p>18 Q (BY MR. ZELLERS) All right. Now -- and</p> <p>19 let me just -- I'll put it in the record there.</p> <p>20 MS. O'DELL: Thank you.</p> <p>21 Q (BY MR. ZELLERS) If you look at the</p> <p>22 Langseth paper, on the second page, Figure 1, they</p> <p>23 list out all of the population -- or at least a</p> <p>24 great number of the population-based and</p> <p>25 case-control studies and the hospital-based</p>
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<p>1 A In general, case-control studies are often</p> <p>2 plagued with selection bias, but they don't have to</p> <p>3 be.</p> <p>4 Q (BY MR. ZELLERS) Well, recall bias can</p> <p>5 distort a scientific evaluation of whether an</p> <p>6 exposure is actually related to a disease, correct?</p> <p>7 A Yes.</p> <p>8 Q So for example, recall bias could distort</p> <p>9 results if women with ovarian cancer were more</p> <p>10 likely to remember their exposure to talc than women</p> <p>11 without ovarian cancer; is that right?</p> <p>12 A That is a theoretical risk.</p> <p>13 Q In fact, in your report on page 17, you</p> <p>14 acknowledge that the risk of bias is greater for</p> <p>15 case-control studies as opposed to cohort studies;</p> <p>16 is that right?</p> <p>17 A Yes.</p> <p>18 Q Recall bias could explain the fact that</p> <p>19 some retrospective case-control studies have found a</p> <p>20 statistically significant relationship between</p> <p>21 talcum powder and ovarian cancer, but the cohort</p> <p>22 studies have not, correct?</p> <p>23 A That is a theoretical risk. To do that</p> <p>24 you would need to have some knowledge in the</p> <p>25 population that influenced that recall bias, but</p>	<p>1 case-control studies; is that right?</p> <p>2 A Yes, they do.</p> <p>3 Q (BY MR. ZELLERS) At least among the</p> <p>4 hospital-based case-control studies that are</p> <p>5 identified by Langseth in Figure 1, it appears that</p> <p>6 there's six hospital-based case-control studies.</p> <p>7 None of those hospital-based case-control</p> <p>8 studies show a statistically significant</p> <p>9 association, correct?</p> <p>10 MS. O'DELL: Object to the form.</p> <p>11 A We discussed this yesterday. But if</p> <p>12 you're asking if the individual hospital-based</p> <p>13 studies overlap one, then they overlap one.</p> <p>14 Q (BY MR. ZELLERS) They do not overlap one?</p> <p>15 A The -- the hospital-based studies do</p> <p>16 overlap one.</p> <p>17 Q Okay. The population-based case-control</p> <p>18 studies, which are up above in our</p> <p>19 Langseth Figure 1, some of those -- if we look at</p> <p>20 the individual studies -- show statistical</p> <p>21 significance, and some of those do not; is that</p> <p>22 right?</p> <p>23 A I'm -- I'm hesitant to be as definitive</p> <p>24 about using the confidence interval that are</p> <p>25 presented here as being a reflection of statistical</p>

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<p>1 significance.</p> <p>2 All of them are shifted to the right. All</p> <p>3 of them have a positive association. And the</p> <p>4 confidence interval for some of them overlap one.</p> <p>5 But taken as a group, there's statistical</p> <p>6 significance for the entirety of the population --</p> <p>7 of the population of studies that he looked at.</p> <p>8 Q As we did discuss yesterday, if you look</p> <p>9 at the population-based studies individually, at</p> <p>10 least based upon what's reported by Langseth in his</p> <p>11 Figure 1, some demonstrate statistical significance</p> <p>12 and some do not; is that right?</p> <p>13 A I -- again, it's -- they're slightly --</p> <p>14 it's -- it's not the only -- the confidence interval</p> <p>15 overlapping one is sort of what I consider a</p> <p>16 quick-and-dirty way to answer statistical</p> <p>17 significance.</p> <p>18 It's not exactly that way. But some of</p> <p>19 them clearly suggest statistical significance. I</p> <p>20 think ten of them. And four of them suggest not</p> <p>21 statistical significance. So the individual</p> <p>22 studies. But it's a little more complicated than</p> <p>23 that.</p> <p>24 Q Would you agree that if a study does not</p> <p>25 show statistical significance, that it could mean</p>	<p>1 tell if things are different or the -- or</p> <p>2 indistinguishable, the confidence interval for the</p> <p>3 pooled odds ratio for the population-based studies</p> <p>4 goes from 1.29 to 1.52, so the truth is likely in</p> <p>5 that range, where the truth for the hospital-based</p> <p>6 studies is 0.92 to 1.63. They overlap.</p> <p>7 And so I would interpret that using this</p> <p>8 sort of quick approach is that there's not a</p> <p>9 statistical difference between the summary of the</p> <p>10 pooled odd ratio based on the type of populations</p> <p>11 that were recruited.</p> <p>12 Again, the point estimates are a little</p> <p>13 bit different for sure, 1.4 versus 1.12. But the</p> <p>14 confidence intervals overlap, suggesting that</p> <p>15 they're not -- they're not different.</p> <p>16 Q You are familiar with selection bias; is</p> <p>17 that right?</p> <p>18 A I am.</p> <p>19 Q Would you agree that the hospital-based</p> <p>20 case-control studies may be less susceptible to</p> <p>21 selection bias than population-based case-control</p> <p>22 studies?</p> <p>23 MS. O'DELL: Object to the form.</p> <p>24 A I -- I would not agree with that. In</p> <p>25 general, you think about hospital-based studies as</p>
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<p>1 that no risk exists?</p> <p>2 A If --</p> <p>3 MS. O'DELL: Object to the form.</p> <p>4 A -- an individual study shows no</p> <p>5 statistical significance, it means -- with all</p> <p>6 research -- that the most likely truth is the point</p> <p>7 estimate, which is whatever that point estimate is,</p> <p>8 but that you could not exclude chance as one of the</p> <p>9 possible causes for the results.</p> <p>10 Q (BY MR. ZELLERS) If we looked just at the</p> <p>11 population-based case-control studies and the</p> <p>12 hospital-based case-control studies that are shown</p> <p>13 by Langseth in Figure 1, there is an inconsistency</p> <p>14 between the two in that each of the individual</p> <p>15 hospital-based case-control studies have confidence</p> <p>16 intervals which overlap one, and many of the</p> <p>17 population-based or at least some of the</p> <p>18 population-based studies do not, correct?</p> <p>19 A I -- I do not believe there is</p> <p>20 inconsistency between the pooled odds ratio for</p> <p>21 population-based studies, which has a confidence</p> <p>22 interval that overlaps the confidence intervals for</p> <p>23 the pooled odd ratio for the hospital-based studies.</p> <p>24 So using the approach that you are</p> <p>25 suggesting of using confidence intervals, the way to</p>	<p>1 being potentially a great deal more bias.</p> <p>2 Now, that -- with that caveat, it depends</p> <p>3 on how you found your cases and your controls.</p> <p>4 But in general, you want to find</p> <p>5 population-based cases and controls, I believe,</p> <p>6 rather than hospital-based. But it matters how they</p> <p>7 are recruited.</p> <p>8 Q Hospital-based control studies are</p> <p>9 comparing hospitalized patients to hospitalized</p> <p>10 patients; is that right?</p> <p>11 A I -- I -- in this case, yes, I think</p> <p>12 that's --</p> <p>13 Q And --</p> <p>14 A -- how they define it.</p> <p>15 Q -- in population based studies, you're</p> <p>16 more likely to be comparing ill people to healthy</p> <p>17 people; is that right?</p> <p>18 A Again, it -- it depends on how you're</p> <p>19 selecting. If you're selecting patients who are</p> <p>20 sick in the hospital and comparing that to healthy</p> <p>21 patients who are outpatient population based, that</p> <p>22 would be the kind of bias that you are describing.</p> <p>23 That would be the worst.</p> <p>24 But if you're, in fact, comparing</p> <p>25 relatively comparable population-based cases and</p>

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<p style="text-align: right;">Page 282</p> <p>1 controls, then I don't agree that hospital-based 2 controls are -- are better. 3 Q Penninkilampi. One of the studies that 4 you talked to us about yesterday was Penninkilampi 5 2018; is that right? 6 A Yes. 7 Q Penninkilampi 2018 did not include the 8 Gates 2010 cohort study; is that right? 9 A That's correct. 10 Q Did you verify that the data that 11 Penninkilampi reports is accurate? 12 A I did not. Did I go back and validate 13 their individual abstracted data? 14 Q Yeah. 15 A I did not. 16 Q In determining that a study is of high 17 quality, would it be important to you that the 18 authors are accurately reporting the odds ratios and 19 confidence intervals? 20 A Data accuracy is important to me. And -- 21 and I would look towards the journal peer review 22 process to have done that, yes. 23 Q If -- if there were errors in reporting of 24 the odds ratios or the confidence intervals, that 25 could call into question the reliability of the</p>	<p style="text-align: right;">Page 284</p> <p>1 been established; is that right? 2 A That is what they say. 3 Q Meta-analyses or systematic analyses, that 4 can combine the work of other published studies into 5 one study; is that right? 6 A Yes. 7 Q If there are biases and confounding in the 8 underlying studies, the meta-analysis or the 9 systematic review or analysis will reflect the 10 biases and confounding; is that right? 11 MS. O'DELL: Object to the form. 12 A Any biases in the papers will not go away 13 by combining them. I'm not sure what you mean by 14 "the confounding." If -- if a paper has an 15 accounting for confounding? 16 Q (BY MR. ZELLERS) Let me ask you another 17 question. A proper meta-analysis or systematic 18 review must analyze the sources of heterogeneity 19 across the studies; is that right? 20 A Yes. 21 Q And a proper meta-analysis or systematic 22 review must examine the methodology of each of the 23 underlying studies, correct? 24 A Yes. 25 Q You have given some opinions -- or at</p>
<p style="text-align: right;">Page 283</p> <p>1 study; is that right? 2 MS. O'DELL: Object to the form. 3 A Yes, that's definitely possible. 4 Q (BY MR. ZELLERS) Penninkilampi 2018, that 5 study specifically states that a certain causal link 6 between talc use and ovarian cancer has not been 7 established, correct? 8 MS. O'DELL: Object to the form. 9 A I don't remember them concluding that. 10 But if you tell me where -- 11 Q (BY MR. ZELLERS) Sure. 12 A -- it is -- 13 Q Look at page 42, at the end of first 14 paragraph. 15 A Well, perineal talc use has not been shown 16 to be safe. In a similar regard, a certain causal 17 link between the use and ovarian cancer has not been 18 established -- 19 Q And you -- 20 A -- is what -- 21 Q -- okay. 22 A -- Penninkilampi says. 23 Q And I think you omitted the word "talc." 24 But their specific statement is, A certain causal 25 link between talc use and ovarian cancer has not yet</p>	<p style="text-align: right;">Page 285</p> <p>1 least you state some opinions relating to the 2 biological mechanisms of cancer; is that right? 3 A Yes. 4 Q The biological mechanisms of cancer are 5 not your area of expertise; is that correct? 6 MS. O'DELL: Object to the form. 7 A I'm knowledgeable about the biological 8 mechanism of cancer as a scientist, as a physician, 9 as a cancer epidemiologist. 10 Q (BY MR. ZELLERS) Would you agree that 11 there are others who are more closely involved in 12 the area of biologic plausibility as it relates to 13 the perineal use of talcum powder and ovarian 14 cancer? 15 MS. O'DELL: Object to the form. 16 A I believe there are others who have more 17 expertise directly in that area than I do. 18 Q (BY MR. ZELLERS) Your opinion is that 19 talcum powder travels from the perineal region to 20 the ovaries through the women's reproductive tract; 21 is that right? 22 A Yes. 23 Q If talcum powder can make this migration, 24 can other substances make the same migration? 25 A Yes.</p>

11 (Pages 282 to 285)

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<p>1 Q Sand from the beach?</p> <p>2 A I don't know if there's evidence of sand</p> <p>3 from the beach.</p> <p>4 Q Toilet paper particles?</p> <p>5 A I -- I -- I do not know if there's</p> <p>6 evidence of that.</p> <p>7 Q There are no human studies that</p> <p>8 demonstrate the migration of any particulate matter</p> <p>9 from outside the peri -- peritoneum to the ovaries,</p> <p>10 correct?</p> <p>11 MS. O'DELL: Object to the form.</p> <p>12 A When you say "demonstrate," do you mean</p> <p>13 active demonstration or a suggestion that it has</p> <p>14 gone that route?</p> <p>15 Q (BY MR. ZELLERS) Active -- active</p> <p>16 demonstration.</p> <p>17 A So there are no studies that I know of</p> <p>18 that have taken talcum powder and then documented</p> <p>19 its movement through -- to the ovaries.</p> <p>20 Q Or any particulate from outside the</p> <p>21 perineum to the ovaries, correct?</p> <p>22 MS. O'DELL: Object to the form.</p> <p>23 A I -- I don't know of any sort of active</p> <p>24 studies that have watched it moved. It's rather the</p> <p>25 studies have found the particulate matter at its</p>	<p>1 are a lot of other factors such as sphincters or the</p> <p>2 type of mucosa that it is or mucous barriers that</p> <p>3 might have a very strong relationship to the</p> <p>4 concentration of talc.</p> <p>5 So the rectum and the bladder have</p> <p>6 sphincters, and the mucosa and the vagina and the</p> <p>7 bladder and rectum are very different than the</p> <p>8 mucosa of the ovary. The endometrium has different</p> <p>9 tissue.</p> <p>10 So I agree with you that you would expert</p> <p>11 proximity would be one factor that might affect</p> <p>12 concentration. But the characteristics of the</p> <p>13 tissue, the barriers, the physical or mucosal could</p> <p>14 be expected to have a much bigger impact.</p> <p>15 Q No studies that you're aware of show</p> <p>16 inflammation as a result of genital talc use in the</p> <p>17 rectal, vulvar, vaginal, cervical, and uterine</p> <p>18 tissues; is that right?</p> <p>19 A I do not know of those studies.</p> <p>20 Q And no studies show a link between</p> <p>21 external genital talc use and rectal, vulvar,</p> <p>22 vaginal, cervical, or uterine cancer; is that right?</p> <p>23 MS. O'DELL: Object to the form.</p> <p>24 A That is correct.</p> <p>25 Q (BY MR. ZELLERS) You have not done an</p>
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<p>1 destination and then have supposed it had to travel</p> <p>2 there in some way.</p> <p>3 Q (BY MR. ZELLERS) None of the studies that</p> <p>4 you cite in your report actually looked at whether</p> <p>5 talcum powder can migrate from perineal application</p> <p>6 through the fallopian tubes to the ovaries, correct?</p> <p>7 A Correct.</p> <p>8 MS. O'DELL: Object to the form.</p> <p>9 Q (BY MR. ZELLERS) You also cannot cite any</p> <p>10 article that shows granulomas, fibrosis, or</p> <p>11 adhesions anywhere up the reproductive tract of a</p> <p>12 women as result of her external genital talc</p> <p>13 application; is -- is that right?</p> <p>14 A Yes.</p> <p>15 Q If talcum powder migrates from the</p> <p>16 perineal region to the ovaries, shouldn't exposure</p> <p>17 to talc be far greater in concentration in the</p> <p>18 rectal, vulvar, vaginal, cervical, and uterine</p> <p>19 tissues which are closer to the area of initial</p> <p>20 exposure?</p> <p>21 MS. O'DELL: Object to the form.</p> <p>22 A I think that assumes that proximity and</p> <p>23 concentration, which you would expect which would</p> <p>24 fall off with more distance, is the only factor that</p> <p>25 would determine concentrations when, in fact, there</p>	<p>1 expert review of the inflammation evidence yourself;</p> <p>2 is that fair?</p> <p>3 MS. O'DELL: Object to the form.</p> <p>4 A I -- I have done a lot of reading of the</p> <p>5 inflammation literature. I'm not sure how I would</p> <p>6 define it as an expert or not an expert -- expert</p> <p>7 review.</p> <p>8 Q (BY MR. ZELLERS) You do know that not all</p> <p>9 inflammatory conditions lead to cancer, correct?</p> <p>10 A There's a lot of literature about certain</p> <p>11 inflammation that causes chronic -- in particular a</p> <p>12 lot of different kind of cancers, more publications</p> <p>13 about acute inflammation that does not lead to</p> <p>14 cancer.</p> <p>15 But yes, there are both cancers that are</p> <p>16 very susceptible to inflammation or caused by it and</p> <p>17 some that are not.</p> <p>18 Q Chronic inflammation. There are many</p> <p>19 chronic inflammatory conditions that do not lead to</p> <p>20 cancer; is that right?</p> <p>21 A Yes.</p> <p>22 Q Do you agree that an agent can be a</p> <p>23 carcinogenic for one type of cancer, but not for</p> <p>24 others?</p> <p>25 A Yes.</p>

12 (Pages 286 to 289)

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<p>1 Q Rheumatoid arthritis, that is a chronic 2 inflammation condition, but it does not increase the 3 risk of my ovarian cancer, correct? 4 A Correct. 5 Q The same with psoriasis; is that right? 6 A Not that I know of. 7 Q Page 41 of your report, you conclude that, 8 Regular exposure to talcum powder products causes 9 ovarian cancer in some women. 10 Do you see that? 11 A I do. 12 Q Is there a certain amount of talcum powder 13 that a product must contain to cause inflammation? 14 MS. O'DELL: Object to the form. 15 A I -- I -- I do not know of evidence that 16 quantifies the amount of exposure that's necessary 17 that a published literature supports the amount 18 women use is an amount that leads to cancer, but 19 I -- I don't know if there's a minimum threshold 20 or... 21 Q (BY MR. ZELLERS) Do you consider 22 cornstarch to be a talcum powder product that causes 23 inflammation? 24 MS. O'DELL: Object to the form. 25 A Talcum powder -- cornstarch -- talcum</p>	<p>1 A In a few of the papers I reviewed -- not 2 very many of them, but a few of them had a small 3 proportion of women who were exposed to cornstarch 4 rather than talc powder products. 5 I -- I think it -- they had negative 6 results, but they were small -- a small number of 7 women, so I wouldn't use that to prove that it's 8 safe. 9 But I don't know of any literature that 10 suggests cornstarch is carcinogenic. 11 Q Your opinion that talcum powder products 12 cause inflammation is not based on the determination 13 that there is a threshold amount of talcum powder 14 that will be required to be in the product before 15 you can conclude that the product will cause chronic 16 inflammation; is -- is that right? 17 MS. O'DELL: Object to the form. 18 A I -- I -- I think I would like to agree. 19 I'm just not sure exactly of -- what I am agreeing 20 to. So I -- I don't know any level -- 21 MS. O'DELL: That's always -- 22 A -- of -- 23 MS. O'DELL: -- a good sign you should -- 24 A -- I -- I can't -- 25 MS. O'DELL: -- be --</p>
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<p>1 powder causes inflammation. Cornstarch can also 2 cause inflammation. 3 I believe cornstarch tends to be an acute 4 inflammatory process rather than a chronic 5 inflammation process. But -- 6 Q (BY MR. ZELLERS) You -- 7 A -- I -- I wouldn't consider cornstarch to 8 be a talcum powder -- 9 Q Is -- 10 A -- product. 11 Q -- is there a study that you can point me 12 to that states that any inflammation from cornstarch 13 is acute and not chronic? 14 MS. O'DELL: Object to the form. 15 A There's a literature about cornstarch 16 leading to acute inflammation, for example, in the 17 surgical literature when it was on surgical gloves 18 or on physical exams which has led to its being 19 removed so -- so as to reproduce acute inflammatory 20 processes. 21 Q (BY MR. ZELLERS) My question to you is: 22 Are you aware of any literature that states that 23 cornstarch is not associated with a chronic 24 inflammatory condition? 25 MS. O'DELL: Object to the form.</p>	<p>1 A -- I can't tell exactly what the -- what 2 the question is. 3 I -- there -- I don't know -- I don't know 4 an amount of talcum powder that would make a product 5 safe. 6 Q (BY MR. ZELLERS) Do you believe that 7 cornstarch is a superior alternative to talc? 8 A I believe that talcum powder products will 9 increase women's risk of cancer, and I would avoid 10 using it as a woman or as a doctor counseling my 11 patients. 12 Q Well -- 13 A I don't have views that cornstarch is a 14 carcinogenic product. So in terms of any potential 15 risk-benefit relationship of cornstarch has the same 16 value in terms of absorbency and much fewer risk of 17 harm, then if that's the question, then I think 18 cornstarch is preferable. 19 Q There are no reports in the literature of 20 externally applied talc leading to inflammation, 21 granulomas, fibrosis, or adhesions anywhere along a 22 women's reproductive tract, correct? 23 MS. O'DELL: Objection, asked and 24 answered. 25 A Not that I know of.</p>

13 (Pages 290 to 293)

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<p>1 Q (BY MR. ZELLERS) On page 12 of your report 2 you state, The most widely accepted mechanism for 3 initiation, promotion, and progression of ovarian 4 cancer is tissue inflammation, leading to a series 5 of responses that result in cancer. 6 Do you see that statement? 7 A I do. 8 Q You do not cite any support in your report 9 for that proposition, correct? 10 MS. O'DELL: Object to the form. 11 A I -- I think my -- that first paragraph 12 was sort of an introduction to that section. So 13 then I go on to cite, I -- I think, the supporting 14 evidence within the next few paragraphs. 15 Q (BY MR. ZELLERS) You would agree that 16 research regarding whether chronic inflammation can 17 cause ovarian cancer is ongoing, correct? 18 A It's an active area of research. 19 Q Are you familiar with a paper published by 20 Melissa Merritt in 2008, entitled "Talcum Powder 21 Chronic Pelvic Inflammation and NSAIDS in Relation 22 to Risk of Epithelial Ovarian Cancer"? 23 A I am. 24 Q It's included in your reliance materials 25 on page 17; is that right?</p>	<p>1 inflammation; is that right? 2 A Yes, they do. 3 Q If inflammation is a mechanism for ovarian 4 cancer, you would expect women who use NSAIDS or 5 aspirin to have a lower risk of ovarian cancer, 6 correct? 7 MS. O'DELL: Object to the form. 8 A Other things being equal, you might expect 9 that if you could measure inflammation or influence 10 it by using NSAIDS, that that might be associated. 11 That is true. 12 Q (BY MR. ZELLERS) The literature, though, 13 is mixed in terms of whether or not the use of 14 NSAIDS or aspirin actually reduce the risk of 15 ovarian cancer; is that right, or the incidence of 16 -- 17 A So -- 18 Q -- ovarian cancer? 19 A -- I have reviewed those papers and would 20 agree with you that some seem to suggest one 21 direction, some others. I haven't quantified them 22 together or tried to summarize them. 23 But I would agree. There doesn't seem to 24 be a consistent message in that literature. 25 Q One of those papers is -- that's included</p>
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<p>1 A Can you tell me the title again? Yeah. 2 Okay. 3 Q Sure. Do you have that or I can -- 4 A No. 5 Q -- mark it? 6 A No, I have it. 7 Q If you go to page 174 of the Merritt 8 paper -- and tell me when you're -- 9 A I'm there. 10 Q -- there -- at the bottom of the first 11 paragraph of the discussion, the authors conclude, 12 These results, in combination with previous studies, 13 suggest that chronic inflammation is unlikely to 14 play a major role in the development of ovarian 15 cancer. 16 Is that right? Did I read that correctly? 17 A Using the results that they had available 18 on the data in 2007, that is what Dr. Merritt 19 concluded. 20 Q You also discuss in your report -- well, 21 let me withdraw that. 22 You're familiar with NSAIDS, nonsteroidal 23 antiinflammatory agents; is that right -- 24 A Yes, I am. 25 Q -- and aspirin? Those medicines reduce</p>	<p>1 in your reliance list is the Verdoodt 2017 paper; is 2 that right? That's V E R D O O D T. 3 A I am going to have to defer to seeing 4 that. 5 Q Okay. Let me -- 6 A I believe -- 7 Q -- show you -- 8 A -- it's on my list. 9 Q -- I will mark that paper as Exhibit 31. 10 (Exhibit 31 was marked for identification 11 and is attached to the transcript.) 12 A Thank you. 13 Q (BY MR. ZELLERS) And turn, if you will, to 14 page 5 under "Discussion" on the first paragraph. 15 A And just to confirm, this is -- I -- I 16 have read this. This is a review article, right? 17 Q Yes. 18 A Okay. 19 Q So on page 5 under "Discussion," the first 20 sentence, the authors state, The sparse and 21 equivocal results for the association between NSAID 22 use and mortality among ovarian and endometrial 23 cancer patients preclude any firm conclusions at 24 this point. 25 Is that right?</p>

14 (Pages 294 to 297)

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<p>1 A That is what this author concludes. I'm 2 trying to see what references he used for that, but 3 that is what he concludes. 4 Q Okay. And this is an article that was 5 published in 2017, correct? 6 A Yes. 7 Q Yesterday counsel for plaintiffs indicated 8 that you have -- in addition to the materials in 9 your report -- reviewed a 2018 chapter by Saed and 10 the Harper and Saed 2019 abstract; is that right? 11 A I -- I reviewed several of his abstracts 12 and -- and a recent paper, yes. 13 Q Do you know that Dr. Saed is a paid expert 14 for the Plaintiffs in this litigation? 15 A I know he's a very well-respected 16 scientist that they have supported in his research. 17 Q Is that a yes? 18 MS. BOCKUS: I object. Nonresponsive. 19 MS. O'DELL: Mike, excuse me. 20 MR. ZELLERS: Sure. 21 MS. O'DELL: You said the 2019 abstract. 22 Did you mean the abstract or the manuscript, just to 23 make sure I'm following the conversation? 24 MR. ZELLERS: I -- I believe I mean the 25 abstract. But we mean whatever the doctor has in</p>	<p>1 Q Have you spoken with Dr. Saed? 2 A I have not. 3 Q Have you requested any information from 4 Dr. Saed? 5 A I have not. 6 Q The Saed study just looked at immortalized 7 cell lines; is that right? 8 A Yes, I believe that's how the cell lines 9 were -- 10 Q Are -- 11 A -- defined. 12 Q -- are you -- are you aware that Dr. Saed 13 testified that the cells were modified with a virus 14 to make them keep undergoing division in vitro? 15 A I -- I'm aware that that's what happens to 16 cell lines. I -- I don't believe I saw his 17 deposition to say that. 18 Q Are you aware that Dr. Saed testified that 19 the P53 gene was turned off in those cells? 20 A No, I'm not aware. 21 Q Are you aware based upon your reading that 22 the loss of the P53 protein contributes to 23 unrestrained cellular proliferation? 24 MS. O'DELL: Object to the form. 25 A I -- I believe that the reason you have</p>
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<p>1 her file that we marked yesterday. 2 THE COURT REPORTER: Who objected down 3 there? 4 MS. BOCKUS: Jane Bockus. 5 MS. O'DELL: I think what she had in her 6 file was the manuscript. So I think that's what you 7 marked as an exhibit, but I don't want there to be 8 confusion. 9 Q (BY MR. ZELLERS) You have reviewed several 10 publications within the last year or two from 11 Dr. Saed -- 12 A Yes. 13 Q -- is that right? 14 A Yes, I have. 15 THE COURT REPORTER: Wait. 16 MR. ZELLERS: All right. Are you okay, 17 Ms. Court Reporter? 18 THE COURT REPORTER: Yes. I just have to 19 have you wait until the end of the question, please. 20 Q (BY MR. ZELLERS) Let me re-ask my -- 21 A Please. 22 Q -- question. Did you know that Dr. Saed 23 is a paid expert for the Plaintiffs in this 24 litigation? 25 A Yes, I do.</p>	<p>1 controls in experiment is to account for the 2 underlying expression in turnover cells so you can 3 compare something you do to the cell versus the 4 baseline in order to account for the baseline, 5 whatever it is, proliferation of the cell or 6 apoptosis levels or expression of oxidants or 7 antioxidants. 8 So I -- I -- the way you're asking the 9 question is -- is: Are you comparing this cell line 10 to living cells in context? 11 And I would agree with you that this cell 12 line is different than living cells in context. 13 But if you're asking if it's a valid 14 comparison to do the experiment in this cell line, 15 it is because you are doing an intervention to those 16 cells that has a control group. 17 And so this cell line has a different 18 behavior than a -- a living cell does, but provides 19 a comparison group. 20 Q (BY MR. ZELLERS) What methodology did you 21 use to apply Dr. Saed's results to normal cells in 22 actual organs? 23 A So -- 24 MS. O'DELL: Object to the form. 25 A -- in some of the work that I do around a</p>

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<p>1 different environmental carcinogen -- radiation, for 2 example -- we look at changes of expression, certain 3 enzymes in cells to radiation to understand what 4 that damage does in terms of expression of relevant 5 genes, cell proliferation, and things like that. 6 So I take his research to mean that I can 7 understand the changes to pro oxidants to 8 antioxidants to apoptosis to gene expression in the 9 cell. Not that I can come up with the exact 10 quantification in a patient that would correspond to 11 it, but rather, what mechanisms will be stimulated 12 by the talc. 13 So to answer your question, I -- it tells 14 me what parts of the cell are sensitive to it, but 15 not the quantity that might lead to that 16 sensitivity. 17 Q (BY MR. ZELLERS) Can you cite any data 18 showing that the concentrations of exposure used in 19 the Saed study are the same as would be encountered 20 with the use of cosmetic talc in the perineal 21 region? 22 A I cannot. That's what I was trying to 23 express. 24 Q Can you cite any data showing that the 25 level of concentration of exposure used in the Saed</p>	<p>1 develop enough mutations to develop into cancer. 2 But the greater the oxidative stress for 3 cancer like ovarian cancer, the greater the chance 4 of inducing cancer. 5 Q Can you cite me to any study that says 6 that? 7 MS. O'DELL: Object to the form. 8 A Any study that says that there's a dose 9 response related to the amount of stress and the 10 member -- numbers of cancers? 11 Q (BY MR. ZELLERS) That supports, yes, your 12 statement and your position. 13 A I -- the data that I am thinking of -- and 14 I'm not sure if it's quite the same as the question 15 that you're asking -- is the number of gene 16 mutations is higher in cancer cells than it is in 17 noncancer cells. So -- 18 THE COURT REPORTER: In noncancer? 19 A In non -- cancer cells have many more 20 genetic mutations than noncancer cells. 21 Both have generic mutations. And the 22 environment of having more oxidative stress is 23 associated with getting more mutations -- 24 Q (BY MR. ZELLERS) If -- if it's -- 25 A -- but --</p>
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<p>1 study has ever occurred in women with perineal talc 2 use? 3 MS. O'DELL: Object to the form. 4 A I want to clarify my answer. I don't know 5 those data. 6 Q (BY MR. ZELLERS) Would you agree that 7 reactive oxygen species are a normal part of cell 8 physiology? 9 A Yes. 10 Q Do all substances that cause oxidative 11 stress also cause cancer? 12 A I think you care about the balance of 13 oxidative, pro oxidative, antioxidative levels. 14 That being said, I do not know that every 15 instance where you have more pro oxidative leads to 16 cancer. I know of some where it does. I don't know 17 if it always does. 18 Q Does the presence of oxidative stress in a 19 tissue indicate that cancer will develop in that 20 tissue? 21 A I think I mentioned this yesterday, that 22 there's a sense of a probability. So the 23 probability will likely increase. 24 But most cells, thankfully, will repair 25 and -- that damage, and so most cells will not</p>	<p>1 Q -- are you finished? 2 A -- I -- I am. 3 Q Okay. If -- if exposure to a substance 4 causes oxidative stress in certain tissue, does that 5 mean that the substance will cause oxidative stress 6 in all types of tissues? 7 A No. 8 Q Does the body have a protective mechanism 9 that can limit tissue damage from oxidative stress? 10 A Yes. 11 Q Are there any publications that you are 12 aware of that indicate that oxidative stress is 13 involved in the development of ovarian cancer? 14 A We discussed earlier that inflammation 15 increases oxidative stress such as pelvic 16 inflammatory disease leads to oxidative stress. 17 And pelvic inflammatory disease is 18 associated and leads to ovarian cancer. But I'm not 19 sure if that's answers the question that you are... 20 Q Well, if I had more time, we would discuss 21 that at greater length. You're familiar with the 22 term "confounding" is that right? 23 A I -- I -- Yes, I'm -- 24 Q All right. 25 A -- familiar with that term.</p>

16 (Pages 302 to 305)

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<p style="text-align: right;">Page 306</p> <p>1 Q Confounding is where the presence of 2 another association confuses the relationship 3 between the exposure and the disease being studied; 4 is -- is that right? 5 A Yes. 6 Q Confounding can distort results in 7 epidemiological studies; is that right? 8 A Yes. 9 Q Would you agree that residual confounding 10 is possible in every observational study? 11 A Yes. 12 Q It's also -- strike that. 13 It's possible that unmeasured confounders 14 may be present in every observational study, 15 correct? 16 A Yes. 17 Q It's impossible to say that all known and 18 unknown confounding factors have been controlled for 19 in any given study; is that right? 20 A Yes. 21 Q Would you agree that there are new factors 22 that are being discussed that are possibly involved 23 with ovarian cancer that are just being published in 24 the literature such as a history of chlamydia 25 infection and a history of weight gain during</p>	<p style="text-align: right;">Page 308</p> <p>1 is unavoidable in this type of summary. The large 2 difference in general between adjusted and crude 3 results emphasizes the importance of adjustments 4 when estimating particular risk? 5 THE COURT REPORTER: When estimating? 6 MR. ZELLERS: Particular risk. 7 A Are you asking what I meant by that? 8 Q (BY MR. ZELLERS) Yes. What did you mean 9 by that? 10 A Okay. I -- I would say my sentence is not 11 as clear as it should have been. What I mean -- and 12 I'm not really sure why I pointed this out just for 13 Berge -- it's really a general -- is that the 14 studies they included, adjusted for different 15 covariates. 16 They didn't all adjust for the same 17 covariates. So a variety of covariates, meaning 18 they didn't all adjust for the exact same 19 covariates. 20 But this is unavoidable in this type of 21 study. So I was just saying that some of the 22 included studies adjusted for A, B and C; and others 23 were adjusted for B, C, and D; and others D, E, and 24 F. 25 Q Huncharek, page 26. Do you see that</p>
<p style="text-align: right;">Page 307</p> <p>1 adolescence? 2 MS. O'DELL: Object to the form. 3 A Chlamydia infection would be the most 4 common infection of PID, and so that's something 5 that I just mentioned. I'm not sure that that's 6 such a new one. 7 And weight gain during adolescence is 8 something that's of interest across a range of 9 cancers, like breast cancer. I don't know it 10 personally around ovarian cancer, but... 11 Q (BY MR. ZELLERS) Those factors that we 12 just talked about generally have not been controlled 13 for in any of the published talcum powder ovarian 14 cancer studies; is that right? 15 A I -- the PID, I -- I think, has it in a 16 paper or two. And -- and the weight gain, I -- I 17 don't -- I have never seen that one. 18 Q We talked yesterday about the Berge study. 19 Do you remember that? 20 A I do. 21 Q And you talk about Berge on page 25 of 22 your report. 23 What do you mean when you say, A second 24 limitation of Berge is that the included studies 25 adjusted for a variety of covariates, although this</p>	<p style="text-align: right;">Page 309</p> <p>1 reference where you talk about that study? 2 A Yes. 3 Q You say that the difference between a 4 relative risk of 1.19 and 1.38 is small; is that 5 right? 6 MS. O'DELL: You're talking about 2007 or 7 2003? 8 Q (BY MR. ZELLERS) Whichever -- 9 A Which page? 10 Q -- so page 26 -- 11 MS. O'DELL: They're both on the same 12 page. 13 Q (BY MR. ZELLERS) I think I'm looking at 14 the one at the bottom. 15 MS. O'DELL: Okay. All right. 2003? 16 MR. ZELLERS: Yes. 17 Q (BY MR. ZELLERS) So are you with me? Are 18 you looking at your last couple of lines there on 19 page 26? 20 A Yes. 21 Q And you do say that the difference between 22 a relative risk of 1.19 and 1.38 is small; is that 23 right? 24 A It -- odds ratios -- 25 Q Yeah.</p>

17 (Pages 306 to 309)

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<p style="text-align: right;">Page 310</p> <p>1 A -- but yes.</p> <p>2 Q All right. And -- and so a difference in</p> <p>3 odds ratios of .19, you would consider that to be a</p> <p>4 small difference?</p> <p>5 MS. O'DELL: Object to the form.</p> <p>6 A You're asking why I said those differences</p> <p>7 are small?</p> <p>8 Q (BY MR. ZELLERS) No. Well, what I guess</p> <p>9 what I want to know is: Would you agree that the</p> <p>10 difference between an odds ratio of 1.0 and 1.2 is</p> <p>11 small?</p> <p>12 MS. O'DELL: Object to the form.</p> <p>13 A I think the question of whether or not you</p> <p>14 have a difference of absolute odds of .2 along</p> <p>15 different values means the same thing. And I would</p> <p>16 say it doesn't mean the same thing.</p> <p>17 So if you have an odds ratio as an example</p> <p>18 of 4.7 versus 4.9, they're kind of the same number.</p> <p>19 If you have a number that's 1.0 versus 1.2, those</p> <p>20 are not the same number.</p> <p>21 So I don't think you would want to assume</p> <p>22 the shift in the absolute magnitude of the</p> <p>23 difference in odds. I often published difference in</p> <p>24 odds ratios of .2 is stable.</p> <p>25 But I think is -- your point is well taken</p>	<p style="text-align: right;">Page 312</p> <p>1 A Yeah.</p> <p>2 Q -- yesterday?</p> <p>3 A So the most important -- as it points out</p> <p>4 here in -- in Huncharek, the next sentence of where</p> <p>5 we are, is that this review looked at any exposure</p> <p>6 rather than quantifying.</p> <p>7 And I think the primary concern that I had</p> <p>8 was that any exposure is a very vague definition.</p> <p>9 And I thought it was much more important to have a</p> <p>10 meaningful measure of exposure.</p> <p>11 So the studies that I primarily included</p> <p>12 were ones that had quantification of the exposure,</p> <p>13 but also had some other requirements.</p> <p>14 I -- I -- I want to say that my systematic</p> <p>15 review was one piece of the information that I</p> <p>16 considered, but my summary estimate in the</p> <p>17 systematic review that I completed had the same</p> <p>18 conclusion as all these other systematic reviews.</p> <p>19 In the ballpark, it just gave me greater</p> <p>20 confidence that we were truly looking at regular</p> <p>21 exposure rather than any exposure.</p> <p>22 Now, we know that the most common exposure</p> <p>23 is regular exposure. That's the -- the more</p> <p>24 important -- most common.</p> <p>25 Q Take a look at page 39 in your report</p>
<p style="text-align: right;">Page 311</p> <p>1 that that's not a trivial difference. I was just</p> <p>2 saying in the context of a systematic review, those</p> <p>3 are both very strong, positive associations, and</p> <p>4 that's a relatively minor difference.</p> <p>5 Q (BY MR. ZELLERS) An odds ratio range of</p> <p>6 1.19 to 1.38 is much closer to an odds ratio of 1.0</p> <p>7 to 1.2 than it is to an odds ratio of 4.5 to 4.7,</p> <p>8 correct?</p> <p>9 A I -- I think that's a valid -- a valid</p> <p>10 comparison.</p> <p>11 Q On page 26, 27, there's a carryover there,</p> <p>12 but you state that the population controls are more</p> <p>13 likely relevant and valid than hospital controls.</p> <p>14 What's your support for that?</p> <p>15 A It's what we discussed earlier. I -- I</p> <p>16 think population-based controls are -- are better</p> <p>17 than hospital-based controls.</p> <p>18 Q With respect to your systematic review,</p> <p>19 did you attempt to identify gaps or flaws in the</p> <p>20 underlying studies?</p> <p>21 A I reviewed the individual studies and set</p> <p>22 forth criteria that I thought were required for</p> <p>23 inclusion.</p> <p>24 Q What were those criteria? Are those</p> <p>25 contained in your forms that we talked about --</p>	<p style="text-align: right;">Page 313</p> <p>1 where you discuss temporality; is that right?</p> <p>2 A Yes.</p> <p>3 Q You say that women may use talc when</p> <p>4 undergoing ovarian cancer treatment.</p> <p>5 Do you see that?</p> <p>6 A Yes.</p> <p>7 Q What is your support for that or what is</p> <p>8 that statement based on?</p> <p>9 A I -- I think it's based on my clinical</p> <p>10 experience that postop patients often will use</p> <p>11 talcum powder products for systematic relief of</p> <p>12 symptoms that could be related to the surgical</p> <p>13 procedure itself.</p> <p>14 Q All right. Asbestos. Are your opinions</p> <p>15 in this case dependent on talcum powder containing</p> <p>16 asbestos?</p> <p>17 A No, they're not.</p> <p>18 Q Are your opinions in this case dependent</p> <p>19 on talcum powder containing trace amounts of metals?</p> <p>20 MS. O'DELL: Object to the form.</p> <p>21 A No, they're not.</p> <p>22 Q (BY MR. ZELLERS) Are your opinions in this</p> <p>23 case dependent upon talcum powder containing any</p> <p>24 particular fragrance chemical?</p> <p>25 A No, they're not.</p>

18 (Pages 310 to 313)

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<p>1 Q Do you believe that talcum powder, which 2 does not contain asbestos, causes ovarian cancer? 3 A I don't have any data on which to conclude 4 based on epidemiologic evidence that there is such a 5 product, so I don't know that there is any product 6 that has been studied that doesn't contain asbestos 7 and fibrous talc. 8 I think in a laboratory setting, people 9 have studied products that they describe as being 10 asbestos free, and those products do cause cellular 11 damage. 12 But from an epidemiologic perspective, 13 which is primarily the data I looked at, all of the 14 products that have been studied, I believe contain 15 asbestos and fibrous talc. 16 Q You have made an assumption or it is your 17 belief that all talcum powder products contain 18 asbestos; is that right? 19 MS. O'DELL: Object to the form. 20 A My belief is that many talcum powder 21 products contain asbestos or -- 22 Q (BY MR. ZELLERS) If -- 23 A -- fibrous. 24 Q -- if your assumption about contamination 25 of talcum powder products with asbestos were not</p>	<p>1 A I -- I haven't seen any. 2 Q (BY MR. ZELLERS) Have you requested any? 3 MS. O'DELL: Object to the form. There 4 have been no defense expert reports in this case. 5 MR. ZELLERS: Counsel, please object to 6 form. There have been many defense expert reports 7 in the talcum powder litigation generally. 8 But my question was whether or not she has 9 seen anything, so she can -- I think she has already 10 answered. 11 Q (BY MR. ZELLERS) Is that right? Have you 12 answered the question? 13 MS. O'DELL: Object to the form. 14 A I have asked to see reports. No. I have 15 asked to see testing results. I have not asked to 16 see reports. 17 Q (BY MR. ZELLERS) Have you seen testing 18 results from the FDA and its testing of talcum 19 powder? 20 A I have. 21 Q The FDA did some testing in 2010. Did you 22 see those results? 23 A I did. 24 MS. O'DELL: Do you need a break or are 25 you good or --</p>
Page 315	Page 317
<p>1 true, would that change your opinions in this case? 2 MS. O'DELL: Object to the form. 3 A In -- in this case, it would not. I -- 4 I -- the epidemiologic evidence is very strong that 5 exposure to talcum powder products, whatever it 6 contains, is carcinogenic. 7 Q (BY MR. ZELLERS) You have looked at 8 several reports from Dr. Longo; is that right? 9 A I have. 10 Q You're aware he is a paid litigation 11 expert; is that right? 12 A Yes, I am. 13 Q You're aware he wrote his reports for the 14 purpose of this litigation and that those reports 15 have not been published; is that right? 16 A I -- I know that he has generated a report 17 for this, yes. 18 Q Do you know if any defense ex -- strike 19 that. 20 Do you know if any defense experts have 21 addressed or responded to Dr. Longo's litigation 22 reports? 23 MS. O'DELL: I would object to the form. 24 There's been no defense reports in this case, as you 25 know.</p>	<p>1 A I actually would love a -- a break. I 2 don't mind going a few more minutes, if that would 3 be good or -- but otherwise, I would love a break. 4 MS. O'DELL: Whenever is a good time. 5 MR. ZELLERS: Sure. I'll just finish 6 this. 7 Q (BY MR. ZELLERS) I'll hand you the 8 exhibit, Exhibit 32. 9 (Exhibit 32 was marked for identification 10 and is attached to the transcript.) 11 Q (BY MR. ZELLERS) Is that -- 12 A Thank you. 13 Q -- the -- at least some of the testing by 14 the FDA that you have seen? 15 A Yes, it is. 16 Q That testing was done by an independent 17 laboratory; is that right? 18 A I -- I -- I don't know that, but I believe 19 you. 20 Q Take -- 21 MS. O'DELL: Do you have a copy for me? 22 MR. ZELLERS: Oh, I'm so sorry. I have 23 that, yes. Sorry. 24 MS. O'DELL: Thanks. 25 Q (BY MR. ZELLERS) If you go to the second</p>

19 (Pages 314 to 317)

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<p>1 page, the second paragraph, We contracted with AMA 2 Analytical Services of Lanham, Maryland, to conduct 3 this laboratory service -- or strike that -- survey. 4 Do you see that? 5 A I don't. I'm on the right page. 6 Q On the second page. 7 A The second page. 8 Q The second paragraph, the second -- 9 A Yes. 10 Q -- sentence -- 11 A -- yes. Yes. Thank you. 12 Q All right. 13 A Yes. 14 Q And at least based upon this report, no 15 asbestos was detected in the talcum powder that was 16 tested; is that right? 17 A In the reports that they show, which 18 might -- my understanding is that they had two 19 samples of baby powder, talcum powder in this. And 20 that in those two specimens using the testing method 21 they used, they didn't find evidence of asbestos. 22 MR. ZELLERS: All right. Let's take a 23 break. 24 THE VIDEOGRAPHER: The time is 10:47 a.m. 25 We are now off the record.</p>	<p>1 would like -- she edits all of my publications 2 before I submit them. 3 Q (BY MR. ZELLERS) When we left the last 4 session, I asked you about asbestos and whether or 5 not asbestos is contained in talcum powder. 6 Is there any amount of asbestos that would 7 be safe in talcum powder products? 8 A And the simple answer would be no, I don't 9 think there's any amount that would be safe in 10 talcum powder products. 11 Q All right. Is there any amount of trace 12 metals that would be safe in talcum powder products? 13 MS. O'DELL: Object to the form. 14 A I believe there would be amounts of trace 15 metals that would be acceptable. 16 Q (BY MR. ZELLERS) Are there any amounts of 17 fragrance chemicals that would be safe in talcum 18 powder products? 19 A I believe there would be in certain 20 categories. And in others, there would not. 21 Q There have been no fragrance chemicals, to 22 your knowledge, that have been found in a study to 23 be associated with ovarian cancer, correct? 24 MS. O'DELL: Object to the form. 25 A I -- I know of no -- no such exploration.</p>
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<p>1 (A break was taken from 10:47 a.m. to 1 2 11:00.) 3 THE VIDEOGRAPHER: It's 11:00 a.m. We are 4 now back on the record. Here begins Media No. 2 of 5 the deposition of Dr. Rebecca Smith-Bindman, Ph.D., 6 Volume II. 7 Q (BY MR. ZELLERS) Dr. Smith-Bindman, I was 8 handed the invoice for Chris Tachibana, which we 9 have marked as Exhibit 33. 10 (Exhibit 33 was marked for identification 11 and is attached to the transcript.) 12 Q (BY MR. ZELLERS) Is that the invoice that 13 your copy editor provided to you? 14 A Yes. 15 Q Are there any other invoices that you have 16 received from her? 17 A No. 18 Q Do you expect there to be any other work 19 that Ms. Tachibana does with respect to your report? 20 A Not with respect to my report. 21 If I move ahead to publish these results, 22 then I would likely reach out to her to help -- as 23 well. 24 THE COURT REPORTER: To help? 25 A If we choose to publish the results, I</p>	<p>1 Q (BY MR. ZELLERS) Do you have an opinion on 2 what type of asbestos is in talcum powder products? 3 A I believe asbestos is sort of a family of 4 chemicals. I think there are six that kind of get 5 grouped together. I think all of them have been 6 identified in talcum powder products, but I don't 7 know the distribution of the different kinds. 8 Q What type of asbestos is associated with 9 ovarian cancer? And by that question, you believe 10 that there's six subtypes of asbestos -- 11 MS. O'DELL: Object to the form. 12 Q (BY MR. ZELLERS) -- is that generally your 13 understanding? 14 A It's generally my understanding. 15 Q Are -- are you able to give us any 16 opinions with respect to what type or types of 17 asbestos is associated with ovarian cancer? 18 A The -- the strongest summary of the 19 relationship that I know about is in the IARC 2012 20 reports. 21 And those are from a number of different 22 studies, including some cohort studies and case 23 control studies. 24 To my knowledge, I don't know that they 25 have divided them by the type of mineral silicate</p>

20 (Pages 318 to 321)

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<p>1 fibers that were in those studies.</p> <p>2 Q What amount of asbestos exposure is</p> <p>3 associated with ovarian cancer?</p> <p>4 MS. O'DELL: Object to the form.</p> <p>5 A To the best of my knowledge, the amount</p> <p>6 that's contained within talc powder products is</p> <p>7 probably associated with -- the amount that's in</p> <p>8 there is probably the -- cancer.</p> <p>9 Q (BY MR. ZELLERS) Can you be any more</p> <p>10 definitive?</p> <p>11 A The talcum powder products that women have</p> <p>12 used is associated with ovarian cancer. And I</p> <p>13 believe that to know how much asbestos it takes to</p> <p>14 cause cancer, the easiest way to answer that is to</p> <p>15 quantify how much asbestos is within the --</p> <p>16 the powder products.</p> <p>17 So I'm not in any way an expert on this.</p> <p>18 But in the Longo report, it talked about an average</p> <p>19 of 50,000 particles of asbestos being in each</p> <p>20 gram of -- on average in each gram of baby powder</p> <p>21 products.</p> <p>22 And he estimates that in a container, that</p> <p>23 would be millions of particles, which seems like a</p> <p>24 large number to me, but -- so I don't know the</p> <p>25 amount that would be required to be carcinogenic,</p>	<p>1 A I did not.</p> <p>2 Q Would you agree that research on the</p> <p>3 potential relationship between asbestos and ovarian</p> <p>4 cancer has only considered a small number of cases?</p> <p>5 MS. O'DELL: Object to the form.</p> <p>6 A I think the IARC review on the</p> <p>7 occupational exposures to asbestos had quite a</p> <p>8 number of cancers, but I would have to go back to</p> <p>9 those studies to remember the number.</p> <p>10 Q (BY MR. ZELLERS) Did you review the Reid</p> <p>11 2011 study?</p> <p>12 A I believe that's one that I -- I reviewed.</p> <p>13 Q Do you need me to hand that to you if --</p> <p>14 A Yes --</p> <p>15 Q -- ask you a couple of questions about it?</p> <p>16 A -- please.</p> <p>17 Q Now, in the Reid 2011 paper, which we will</p> <p>18 mark as Exhibit 34 --</p> <p>19 A And is that one of the studies that</p> <p>20 Camargo included in -- I think it is -- in his</p> <p>21 systematic review? Yeah. So this is a different</p> <p>22 systematic review.</p> <p>23 (Exhibit 34 was marked for identification</p> <p>24 and is attached to the transcript.)</p> <p>25 Q (BY MR. ZELLERS) Do you recognize</p>
Page 323	Page 325
<p>1 but that's the amount that they were exposed to that</p> <p>2 was carcinogenic.</p> <p>3 Q What type of ovarian cancer is asbestos</p> <p>4 associated with?</p> <p>5 MS. O'DELL: Object to the form.</p> <p>6 A I think the most stable estimate of the</p> <p>7 association of talcum powder products with ovarian</p> <p>8 cancer is for all ovarian cancer and the</p> <p>9 meta-analysis that others did. And my summary</p> <p>10 estimate was for all ovarian cancer -- epithelial</p> <p>11 ovarian cancer, I should say.</p> <p>12 In my more limited review, I focused on</p> <p>13 serous cancer, because I think as the most common</p> <p>14 cancer -- the most common invasive cancer, it's the</p> <p>15 one where there's enough statistical power to</p> <p>16 quantify the association, so I think the data are</p> <p>17 the most compelling for serous ovarian cancer.</p> <p>18 But the overall meta-analysis looks at any</p> <p>19 cancer, and that's what we did as well.</p> <p>20 Q You -- you looked at talcum powder,</p> <p>21 correct?</p> <p>22 A Talcum powder products, yes.</p> <p>23 Q You did not undertake a Bradford Hill</p> <p>24 analysis of the literature on asbestos and ovarian</p> <p>25 cancer, correct?</p>	<p>1 Exhibit 34?</p> <p>2 A No.</p> <p>3 Q Okay. Well, Exhibit 34 is a study and --</p> <p>4 and a review by the first named author, Allison</p> <p>5 Reid.</p> <p>6 "Does Exposure to Asbestos Cause Ovarian</p> <p>7 Cancer?"</p> <p>8 A I -- I have seen this paper.</p> <p>9 Q All right.</p> <p>10 A I'm sorry. I didn't remember. So sorry.</p> <p>11 Q If you look at her conclusions -- or the</p> <p>12 author's conclusions on the right-hand side of the</p> <p>13 first page -- so I'm --</p> <p>14 A Yes.</p> <p>15 Q -- looking right here --</p> <p>16 A Yes.</p> <p>17 Q -- the relationship between asbestos</p> <p>18 exposure and ovarian cancer is not well</p> <p>19 understood -- is not as well understood as -- as</p> <p>20 that of asbestos-related diseases. Studies that</p> <p>21 have examined this issue have been limited for two</p> <p>22 major reasons.</p> <p>23 No. 1, there's a small number of cases.</p> <p>24 And No. 2, there's difficulties with diagnosis and</p> <p>25 specifically distinguishing between peritoneal</p>

21 (Pages 322 to 325)

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<p>1 mesothelioma and ovarian cancer; is -- is that 2 right? 3 MS. O'DELL: Object to the form. 4 A So this -- those are the conclusions that 5 she makes. But I -- I want just to explain what she 6 means by "small number of cases." 7 She's comparing it to the number of men 8 exposed to asbestos. Just there -- there are many 9 more men exposed to asbestos than -- than women 10 exposed to asbestos. 11 So I think -- I mean, I -- I think it's a 12 challenge, but I -- wouldn't say that there are a 13 small number of cases. 14 MR. ZELLERS: Move to strike as 15 nonresponsive. 16 Q (BY MR. ZELLERS) Would you agree that most 17 of the studies that have been done and the data that 18 exists relates to occupational exposure of asbestos 19 and ovarian cancer? 20 A Yes. I -- 21 Q All right. 22 A -- yes. 23 Q You looked at the Camargo paper 2011; is 24 that right? 25 A Yes.</p>	<p>1 author state, Further limitation of our analysis was 2 its inability to account for nonoccupational risk 3 factors for ovarian cancer other than age? 4 A Yes, I do see that. 5 Q On page 25 -- I'm sorry -- 1215. So the 6 page before the second paragraph under "Discussion," 7 they talk about Edelman 1992; is that right? 8 A Yes. 9 Q And the authors state, They concluded, 10 however, that despite the positive and significant 11 association, there was insufficient information to 12 infer that ovarian cancers were caused by 13 occupational exposure to asbestos -- 14 A I -- I'm sorry. I -- 15 Q Sure. 16 A -- I -- I'm lost. Where are we? 17 Q Okay. So do you see under "Discussion" -- 18 A Yes. 19 Q -- the second paragraph -- 20 A Yes. 21 Q -- I believe the second sentence? It 22 says, They concluded. 23 Are you with me? 24 A Yes. They are describing another 25 meta-analysis --</p>
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<p>1 Q That study points out that there's an 2 inability to account for nonoccupational risk 3 factors for ovarian cancer in these studies other 4 than age; is that right? 5 MS. O'DELL: If -- if you remember. If 6 you need to see -- 7 A I -- I don't remember. 8 Q (BY MR. ZELLERS) All right. Do you have 9 the Camargo paper in front -- 10 A I -- 11 Q -- of you or would you like me to give it 12 to you? 13 A -- please. 14 Q Camargo 2011, we will mark as deposition 15 Exhibit 35. 16 (Exhibit 35 was marked for identification 17 and is attached to the transcript.) 18 A Thank you. 19 Q (BY MR. ZELLERS) Do you have that in front 20 of you now? 21 MS. O'DELL: Thank you. 22 A Yes, I do. 23 Q (BY MR. ZELLERS) Camargo. Take a look, if 24 you will, you know, on page 1216. The second 25 paragraph above "Conclusion," does Camargo and the</p>	<p>1 Q Yes. 2 A -- they concluded, yes. 3 Q This -- this is a review of different meta 4 -- 5 A Yeah. 6 Q -- analyses; is that right? 7 A Yes. 8 Q And they're describing Edelman 1992. And 9 they state, They concluded, however, that despite 10 the positive and significant association, there was 11 insufficient information to infer that ovarian 12 cancers were caused by occupational exposure to 13 asbestos because of concerns about tumor 14 misclassification, inappropriate comparison 15 populations, and the failure to take into account 16 for known risk factors. 17 Is that right? 18 A You're reading from Camargo, who is 19 quoting from a discussion by Edelman, so that -- 20 that's what it says. I -- I don't -- I don't know 21 that that's what Edelman says, but -- but yes, 22 that's the... 23 Q Wouldn't you expect to find higher rates 24 of other cancers in women using talc, like 25 mesothelioma, if they are being exposed to</p>

22 (Pages 326 to 329)

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<p>1 substantial amounts of asbestos? 2 MS. O'DELL: Object to the form. 3 A I -- I'm confused. I'm confused. Are you 4 saying women exposed to asbestos are not getting 5 mesothelioma? 6 Q (BY MR. ZELLERS) Well, let me ask it this 7 way: Are -- are women who use talc in the perineal 8 region at greater risk of mesothelioma? 9 A I do not know studies that have said that. 10 Q Are women who use talc in the perineal 11 region at greater risk of asbestosis? 12 A In the lungs? 13 Q Yes. 14 A I -- I do not know those studies. 15 Q With respect to fragrance chemicals, you 16 have no evidence that the blood or tissue levels of 17 any trace metals are higher in genital talc users 18 compared to nonusers, correct? 19 A I -- I don't know that literature at all. 20 Q And you have no knowledge as to either the 21 amount or concentration of different fragrance 22 chemicals in the baby powder, correct? 23 A I -- I do not. 24 MR. ZELLERS: Okay. I have no further 25 questions. My colleagues may have some questions.</p>	<p>1 Q Okay. So when -- if you answered a 2 question, is it because you believe you understood 3 it and that you felt able to answer it? 4 A Yes. 5 MS. O'DELL: Object to the form. 6 Q (BY MS. BOCKUS) Okay. So before being 7 hired in this case, you had not really looked at the 8 association between talc and ovarian cancer; is that 9 fair? 10 A That's correct. 11 Q The person who wrote to you first, do you 12 remember if it was a male or a female, the attorney? 13 A I think it was a women. 14 Q Okay. And have you -- tell me what search 15 you have done to locate that person's name. 16 A I could probably search some more. I -- 17 I -- my correspondence with these lawyers that I 18 have a document of on my computer is from July. 19 But Mike reminded me that I must have met 20 with them in June. So I could go through -- there 21 are ways I can access older e-mails to look if 22 that's important to you. I'm happy to try and find 23 that person. 24 Q I just was curious. There -- because you 25 have nothing in the published literature about the</p>
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<p>1 MS. BOCKUS: Could we go off the record 2 for just a minute to move the microphone down? 3 THE VIDEOGRAPHER: The time is 11:16 a.m. 4 We are off the record. 5 (A break was taken from 1:16 a.m. to 11:17 6 a.m.) 7 THE VIDEOGRAPHER: The time is 11:17 a.m 8 we are now back on the record. 9 EXAMINATION BY COUNSEL FOR THE DEFENDANTS 10 BY MS. BOCKUS: 11 Q Good morning, Doctor. I introduced myself 12 yesterday, I hope. I'm not sure I did. I'm Jane 13 Bockus. I represent Imerys in this matter. 14 How are you feeling today? 15 A I'm good. Thank you. 16 Q Have you gone back to work full time since 17 your skiing accident? 18 A I am primarily a researcher, so I get to 19 choose my own hours. So I have gone back to work 20 full time, but I often leave work a little earlier 21 and take a rest. 22 Q Has your injury from your skiing accident 23 affected your ability to answer all the questions 24 you have been asked in the last day and a half? 25 A It has not.</p>	<p>1 etiology of ovarian cancer, correct? 2 A I do not. And I will tell you I asked the 3 person who contacted me what the case was about, was 4 it an area of my expertise. 5 And the person who contacted me, I think, 6 was someone who knew of me from another case. And 7 it was my researching abilities, not my content 8 expertise, that led her to reach out to me. 9 Q Okay. So it was with the understanding 10 that you would start a whole new area of research in 11 order to answer the question; is that correct? 12 MS. O'DELL: Object to the form. 13 A Yes. 14 Q (BY MS. BOCKUS) Okay. In fact, when you 15 appeared before congress, you stated that you're a 16 clinical radiologist and you conduct research 17 focusing on -- or focused on assessing the risk and 18 benefits of medical imaging, correct? 19 A If -- if you have my testimony there, I'm 20 going to believe you. 21 Q And when you have given interviews or have 22 written opinion pieces, you identify yourself as 23 primarily a radiologist who focuses on evaluating 24 the risks and benefits of medical imaging, correct? 25 MS. O'DELL: Object to the form.</p>

23 (Pages 330 to 333)

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<p>1 A So I have given a lot of interviews, and I 2 often identify as a professor of epidemiology and 3 biostatistics. I'm not sure what interview that you 4 are looking at. 5 I often -- often introduce myself as a 6 professor of obstetrics, gynecology, and 7 reproductive sciences. 8 And my guess is that whomever is 9 publishing the interview will choose to present me 10 in a way that they think highlights my skill. 11 But -- but my -- I'm a professor in 12 radiology and epidemiology and biostatistics, 13 obstetrics, gynecology, and a member of the Philip 14 R. Lee Institute for Health Policies Studies. 15 So I -- I get presented with whichever of 16 those first the presenter thinks might highlight my 17 expertise. 18 Q Are you board-certified in obstetrics and 19 gynecology? 20 A I'm not. 21 Q The Bradford Hill criteria, the first 22 consideration is the "strength of the association"; 23 is that correct? 24 A First criteria? Yes. 25 Q What do you consider to be a strong</p>	<p>1 about a quantitative association, but rather, the 2 biases and legitimacy of the association. 3 Q Are you familiar with the text "Analysis 4 of Case-Control Studies" by Breslow and Day? 5 A I -- I -- yes. 6 Q Do you find that to be a reliable text on 7 the subject of the analysis of case-control studies? 8 MS. O'DELL: Object to the form. 9 A I -- I don't know that chapter or section 10 enough to answer that question without looking at 11 it. 12 Q (BY MS. BOCKUS) But you're familiar with 13 their work? 14 A Yes. 15 Q And they're well-respected 16 epidemiologists? 17 A Yes. 18 MS. O'DELL: Object to the form. 19 Q (BY MS. BOCKUS) You make a statement in 20 your report on page 12 that the most widely accepted 21 mechanism for initiation, promotion, and progression 22 of ovarian cancer is tissue inflammation leading to 23 a series of responses that result in cancer. 24 And you have talked about that sentence a 25 bit with Mr. Zellers already.</p>
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<p>1 association? 2 A So it overlaps a little bit with the 3 second concept of Bradford Hill in the consistency 4 of -- of the data. 5 But where the association is meaningfully 6 and legitimately documented across study designs and 7 patient populations such that the association is 8 believable and meaningful, not necessarily 9 associated with a particular point estimate of 10 association, if that's the question. 11 I don't have any particular number. It's 12 rather the entirety of the relationship, that it's a 13 meaningful quantifiable association. 14 Q Do you teach epidemiology? 15 A I do. 16 Q Can you identify textbooks that you find 17 reliable on the subject of epidemiology? 18 A The textbook that I often use to teach 19 epidemiology is a book -- I -- I'm not sure if the 20 authorship has changed over the years, but by holly 21 Cummings that talks about principles of 22 epidemiology. It's sort of the clearest version 23 that I know. 24 And -- and they -- and I haven't looked 25 this particular question up, but they wouldn't talk</p>	<p>1 Did you do a survey of the literature to 2 determine what was the most widely accepted 3 mechanism for initiation of ovarian cancer? 4 A I did. 5 Q And did you do a survey of the cancer 6 biology literature? 7 MS. O'DELL: Object to the form. 8 A What was the first literature you asked me 9 about? 10 Q (BY MS. BOCKUS) The literature that 11 supported your statement that the most widely 12 accepted mechanism was inflammation. 13 And you said you did a survey on the 14 inflammation literature -- or I mean on the 15 etiology -- let me start all over again. 16 Have you done a survey on articles that 17 discuss the likely mechanism for the etiology of 18 ovarian cancer? 19 A Yes, I have . 20 Q Have you -- have you -- did your survey 21 include the literature on the cancer biology -- 22 A Yes. 23 Q -- of -- 24 A Yes, it did. 25 Q -- of ovarian cancer?</p>

24 (Pages 334 to 337)

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<p style="text-align: right;">Page 338</p> <p>1 A Yes, it did.</p> <p>2 Q And did you find that as the issue of</p> <p>3 inflammation as an initiator of ovarian cancer is</p> <p>4 not a settled question?</p> <p>5 MS. O'DELL: Object to the form.</p> <p>6 A I -- I would acknowledge that -- that none</p> <p>7 of it is settled. It's just the most widely</p> <p>8 accepted, most widely supported, most wide -- widely</p> <p>9 enhanced view supported by the data, but I don't</p> <p>10 think the issue is settled.</p> <p>11 Q (BY MS. BOCKUS) In fact, there's still</p> <p>12 considerable research going on on the subject --</p> <p>13 A Yes --</p> <p>14 Q -- correct?</p> <p>15 A -- I think there is.</p> <p>16 Q In the next paragraph you talk about, for</p> <p>17 example, this is the middle -- there are</p> <p>18 well-described and accepted causal pathways</p> <p>19 linking in -- linking inflammation to bladder</p> <p>20 cancer, gastric cancer, colon cancer, et cetera.</p> <p>21 You would agree and you identify the</p> <p>22 inflammatory sometimes virus or whatever that's --</p> <p>23 that's well described and accepted for all of the</p> <p>24 different cancers that you list there, correct?</p> <p>25 For example, you identify toxic chemicals</p>	<p style="text-align: right;">Page 340</p> <p>1 with body powder use and ovarian cancer, correct?</p> <p>2 MS. O'DELL: Object to the form.</p> <p>3 A I -- I'm going to go back to say that I --</p> <p>4 I don't know what the strength of the association is</p> <p>5 with -- with these individual cancers.</p> <p>6 I -- I don't know if it's a 20 percent</p> <p>7 increase or a 500 percent increase, except for the</p> <p>8 one that I gave the example of of bladder cancer.</p> <p>9 So for bladder cancer, I gave two examples</p> <p>10 that cause inflammation of the bladder. One being</p> <p>11 toxic chemicals and the second being cigarette</p> <p>12 smoking.</p> <p>13 The toxic chemicals have a very strong</p> <p>14 relative risk of 200 or 300, where I think smoking</p> <p>15 has a relative risk of more like 1.3.</p> <p>16 And so I -- I -- I don't know it for these</p> <p>17 other cancers. But at least for bladder cancer,</p> <p>18 which I think is -- I think the second most common</p> <p>19 cancer and cigarette smoke is -- I think the</p> <p>20 association in the ballpark of 1.3.</p> <p>21 I think I have it in here. But -- so for</p> <p>22 most of these, I don't know what that number is.</p> <p>23 MS. BOCKUS: I'm going to object as</p> <p>24 nonresponsive.</p> <p>25 Q (BY MS. BOCKUS) Because the question I</p>
<p style="text-align: right;">Page 339</p> <p>1 for the etiology of bladder cancer, correct?</p> <p>2 MS. O'DELL: Object to the form.</p> <p>3 Q (BY MS. BOCKUS) Do you see where I'm</p> <p>4 reading?</p> <p>5 A I -- I don't see where you're reading</p> <p>6 exactly, but -- but I agree with you that I have</p> <p>7 given examples where we know the cause of the</p> <p>8 inflammation for many of those cancers.</p> <p>9 Q (BY MS. BOCKUS) You would agree that there</p> <p>10 is no equivalent literature linking ovarian cancer</p> <p>11 to talcum powder use, correct?</p> <p>12 MS. O'DELL: Object to the form.</p> <p>13 A I think there's a strong literature on</p> <p>14 components of the analysis. But I think for several</p> <p>15 of the examples I have given, the data are a little</p> <p>16 bit clearer and further along.</p> <p>17 So path -- HPV and cervical cancer has a</p> <p>18 longer historical data collection period when we</p> <p>19 have them --</p> <p>20 Q (BY MS. BOCKUS) And --</p> <p>21 A -- identified. So I think that's your</p> <p>22 question.</p> <p>23 Q -- so the strength of the association</p> <p>24 between HPV virus and cervical cancer is much, much</p> <p>25 stronger than any association that's been reported</p>	<p style="text-align: right;">Page 341</p> <p>1 asked was about the HPV virus and cervical cancer --</p> <p>2 A I don't --</p> <p>3 Q -- correct?</p> <p>4 A -- know the -- the relative --</p> <p>5 Q All right.</p> <p>6 A -- risk for that. But I -- I thought I</p> <p>7 said the only one I do know is the bladder cancer</p> <p>8 numbers.</p> <p>9 Q Has your methodology in determining what</p> <p>10 studies to include and what studies to exclude been</p> <p>11 peer reviewed in any way, shape, or form?</p> <p>12 A It has not.</p> <p>13 Q Has your math --</p> <p>14 A Oh, I'm sorry. Has my methodology been</p> <p>15 peer reviewed?</p> <p>16 Q In -- in this particular case, the method</p> <p>17 --</p> <p>18 A Okay. The method has been peer reviewed.</p> <p>19 But in this particular case, it has not.</p> <p>20 Q So no one has looked over your report and</p> <p>21 determined whether your decision -- and as I</p> <p>22 understand it, it was your decision alone, correct,</p> <p>23 as to whether to include data from a particular</p> <p>24 study or not --</p> <p>25 A Again --</p>

25 (Pages 338 to 341)

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<p>1 Q -- and --</p> <p>2 A -- it was a decision between myself and</p> <p>3 the -- and -- and -- and Dr. Hall --</p> <p>4 Q So --</p> <p>5 A -- just the two of us.</p> <p>6 Q -- okay. So did Dr. Hall participate in</p> <p>7 the decision-making process as to which of the</p> <p>8 case-control studies and the cohort studies to</p> <p>9 include and which to exclude?</p> <p>10 A It -- so it's -- it's a -- the answer is</p> <p>11 partly and partly not.</p> <p>12 So in terms of whether the studies were</p> <p>13 included in the final analysis, Dr. Hall was</p> <p>14 involved in that decision.</p> <p>15 But in terms of setting up the question to</p> <p>16 begin with, she was not involved in that. I -- I</p> <p>17 set that up.</p> <p>18 Q So other than you and Dr. Hall, has anyone</p> <p>19 been involved in the process of determining which</p> <p>20 studies were going to be involved -- in -- were</p> <p>21 going to be included in your systematic review and</p> <p>22 which were not?</p> <p>23 A Nobody else.</p> <p>24 Q Okay. And has anyone other than you and</p> <p>25 Dr. Hall even checked your work for transcription</p>	<p>1 Q Would you agree that you're -- at this</p> <p>2 point in time your report is not yet ready to be</p> <p>3 submitted for peer review?</p> <p>4 MS. O'DELL: Object to the form.</p> <p>5 A I would agree that the description in this</p> <p>6 report needs more detail, more -- to submit it to</p> <p>7 peer review. Not necessarily different work, but</p> <p>8 definitely different detail and description.</p> <p>9 Q (BY MS. BOCKUS) Have you satisfied</p> <p>10 yourself that the studies that you did include do</p> <p>11 not overlap with regard to patients; that you</p> <p>12 haven't counted the same patients multiple times?</p> <p>13 A I -- I am comfortable that I did my best</p> <p>14 to do that. But I know there were some cases where</p> <p>15 I felt like I wasn't 100 percent sure.</p> <p>16 Q And you would agree that by -- including</p> <p>17 the same cases and controls multiple times could</p> <p>18 skew the -- the data?</p> <p>19 MS. O'DELL: Object to the form.</p> <p>20 A I think that that theoretically is a</p> <p>21 concern of mine, which is why I try to you exclude</p> <p>22 them if there was overlap.</p> <p>23 On a practical level, the benefit of</p> <p>24 pooling data from multiple sources is that the final</p> <p>25 summary is less sensitive to any individual result,</p>
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<p>1 errors?</p> <p>2 MS. O'DELL: Object to the form.</p> <p>3 A No.</p> <p>4 Q (BY MS. BOCKUS) And has anyone other than</p> <p>5 you and Dr. Hall checked your work for mathematical</p> <p>6 errors?</p> <p>7 A No.</p> <p>8 Q You excluded all of the data from the</p> <p>9 cohort studies with the exception of the earliest</p> <p>10 reported data from the Nurses' Health Study; is that</p> <p>11 correct?</p> <p>12 A Yes.</p> <p>13 MS. O'DELL: Object to the form.</p> <p>14 Q (BY MS. BOCKUS) Did you run the -- the --</p> <p>15 the numbers to determine if there would be a</p> <p>16 difference if you included the data from all the</p> <p>17 cohort studies and if you excluded them?</p> <p>18 A So the requirement to be in our review was</p> <p>19 to have a measure of regular use of talcum powder</p> <p>20 products, and those other studies didn't have</p> <p>21 something to plug into that equation.</p> <p>22 So -- so I didn't have a number from those</p> <p>23 studies to include in a sensitivity analysis. They</p> <p>24 -- they didn't report regular use, so I -- I</p> <p>25 couldn't do what you are asking me to have done.</p>	<p>1 let alone some patients that might overlap.</p> <p>2 But I agree with you that you want to</p> <p>3 avoid that because of that concern.</p> <p>4 Q (BY MS. BOCKUS) All right. Would you turn</p> <p>5 to page 35 of your study. And I am looking at</p> <p>6 the -- right in the middle of the page, the</p> <p>7 paragraph that starts with the word, Further talc</p> <p>8 particles.</p> <p>9 But I'm going to the last sentence in the</p> <p>10 paragraph.</p> <p>11 "The greater frequency at which talc</p> <p>12 particles are discovered in ovarian cancerous tissue</p> <p>13 than in normal ovarian tissue further supports that</p> <p>14 these target -- particles may be causing cancer."</p> <p>15 You don't have a source for that. You</p> <p>16 don't cite to any study. And I would like to know</p> <p>17 where you got that information.</p> <p>18 MS. O'DELL: Objection to form.</p> <p>19 A I would have to review Heller and</p> <p>20 Henderson. No. Henderson is just cancer.</p> <p>21 So I would have to review -- review</p> <p>22 Heller, but that -- I -- I -- I don't remember what</p> <p>23 the -- cite of it. I would have to look at the</p> <p>24 articles that I cite in that paragraph and see if I</p> <p>25 could remember.</p>

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<p>1 Q (BY MS. BOCKUS) The next statement has to 2 do with the reduction in incidence of ovarian cancer 3 after tubal ligation or hysterectomy? 4 A Yes. 5 Q Is it not correct that that statement is 6 true for both women who have used talcum powder 7 product and who -- let me ask a better question. 8 Here you're talking about that the 9 elevated -- that studies that look at the risk of 10 ovarian cancer associated with powder products 11 report a reduction in risk after hysterectomy or 12 tubal ligation, correct? 13 A Yes. 14 Q Isn't that also true in the general 15 population for all women, that there -- whether they 16 have used talcum powder products or not, that their 17 risk of ovarian cancer is reduced by hysterectomy or 18 oophorectomy -- 19 A Yes. 20 Q -- or tubal ligation? I'm sorry. 21 A Yes. It's even more reduced by 22 oophorectomy. 23 Q Well, sure. I misspoke. 24 MS. BOCKUS: I believe that's all the 25 questions I have. Thank you.</p>	<p>1 attorney who represents Defendant Personal Care 2 Products Council. 3 So for purposes of this deposition when I 4 reference "Personal Care Products Council," I mean 5 PCPC or CPFA or any of its predecessors. Is that 6 okay? 7 A Yes. 8 Q So I want to turn to Exhibit 15, which is 9 your reference list. And that reference list is 10 Exhibit B of your expert report; is that correct? 11 A Yes. 12 Q And if you can turn to page 19 of that 13 reference list. And just let me know when you're 14 there. 15 A I am there. 16 Q And if you go about 75 percent of the way 17 down, there's a reference to a PCPC document. 18 Do you see that? 19 A Yes. 20 Q Do you happen to know what that document 21 is? 22 A I do not. 23 Q Did you rely on this document -- 24 A You would have to -- 25 MS. O'DELL: Object to the form. Excuse</p>
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<p>1 MS. O'DELL: Why don't we go off the 2 record. I'm sorry. Do you -- 3 MR. ZELLERS: No. 4 MR. BILLINGS-KANG: I may have two or 5 three questions. 6 MS. O'DELL: Oh, sorry, James. Yeah, 7 please. 8 THE VIDEOGRAPHER: We are still on? 9 MS. O'DELL: Yes. 10 THE VIDEOGRAPHER: Do we want to go off? 11 MR. BILLINGS-KANG: Yeah. 12 MS. BOCKUS: We need to go off to move the 13 mic. 14 THE VIDEOGRAPHER: The time is 11:37 a.m. 15 We are going off the record. 16 (A break was taken from 11:37 a.m. to 17 11:40 a.m.) 18 THE VIDEOGRAPHER: The time is 11:40 a.m. 19 We are now back on the record. 20 EXAMINATION BY COUNSEL FOR THE DEFENDANTS 21 BY MR. BILLINGS-KANG: 22 Q Good morning, Dr. Smith-Bindman. How are 23 you? 24 A Good. 25 Q My name is James Billings-Kang. I'm an</p>	<p>1 me. Object to the form. If -- if -- 2 A -- you would have to tell me what it is to 3 know if -- 4 MS. O'DELL: -- or show it to her if 5 you -- 6 MR. BILLINGS-KANG: Sure. 7 MS. O'DELL: -- have a question about it. 8 Q (BY MR. BILLINGS-KANG) But for purposes of 9 formulating your opinion in the expert report, did 10 you rely on any PCPC-produced documents? 11 MS. O'DELL: Object to the form. 12 A You would have to show -- 13 MS. O'DELL: Put -- 14 A -- it to me. 15 MS. O'DELL: -- just put it in front of 16 her if you're going to ask her a question about it 17 so she can -- 18 Q (BY MR. BILLINGS-KANG) I'm just asking: 19 Based on your memory, do you recall using any 20 PCPC-produced document to formulate your opinion. 21 MS. O'DELL: I would -- I would just 22 object to the form. 23 Q (BY MR. BILLINGS-KANG) That's -- 24 MS. O'DELL: None of -- 25 Q (BY MR. BILLINGS-KANG) -- that's fine.</p>

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<p>1 You can answer --</p> <p>2 MS. O'DELL: None of that --</p> <p>3 Q (BY MR. BILLINGS-KANG) -- yes or no, if</p> <p>4 you remember.</p> <p>5 MS. O'DELL: -- none of us would be</p> <p>6 expected to remember a document based on a Bates</p> <p>7 number.</p> <p>8 Q (BY MR. BILLINGS-KANG) Well, I'm asking</p> <p>9 her just generally PCPC-produced documents, if she</p> <p>10 relied on any of those --</p> <p>11 MS. O'DELL: Objection.</p> <p>12 Q (BY MR. BILLINGS-KANG) -- to formulate her</p> <p>13 opinion?</p> <p>14 MS. O'DELL: Object to the form. I'm</p> <p>15 putting that --</p> <p>16 MR. BILLINGS-KANG: Sure.</p> <p>17 MS. O'DELL: -- that Bates number in front</p> <p>18 of her. And if you --</p> <p>19 MR. BILLINGS-KANG: Sure.</p> <p>20 MS. O'DELL: -- remember, you remember.</p> <p>21 A This is a document that lists different</p> <p>22 research studies that have been done over time. Is</p> <p>23 that the document that we're --</p> <p>24 Q (BY MR. BILLINGS-KANG) Well, I -- I'm not</p> <p>25 too sure. This is a document you listed in the</p>	<p>1 itself.</p> <p>2 Q Just --</p> <p>3 A I don't remember --</p> <p>4 Q -- the document --</p> <p>5 A -- seeing --</p> <p>6 Q -- itself.</p> <p>7 A -- this -- I don't remember seeing this</p> <p>8 document.</p> <p>9 Q Okay. You can -- you can put that away.</p> <p>10 And I will go to your expert report that's</p> <p>11 Exhibit 2, page 14. Just let me know when --</p> <p>12 A I'm there.</p> <p>13 Q -- you're there. And this -- the first</p> <p>14 paragraph under "Asbestos," it's about halfway in</p> <p>15 that first paragraph beginning with, Because of</p> <p>16 concern that asbestos was present in talcum powder</p> <p>17 products in the known carcinogenicity of asbestos,</p> <p>18 it has been reported that voluntarily guidelines</p> <p>19 were established by the cosmetic industry in 1976 to</p> <p>20 limit the content of asbestos fibers in commercial</p> <p>21 talc preparations.</p> <p>22 Did I read that correctly?</p> <p>23 A You did.</p> <p>24 Q And these are your words, correct?</p> <p>25 A Yes, they are.</p>
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<p>1 reference list.</p> <p>2 A I -- I'm just trying to make sure that I'm</p> <p>3 looking at the document that you are --</p> <p>4 Q According to your counsel, this is what's</p> <p>5 been identified on page 19 of the reference list.</p> <p>6 A I -- I do not remember this document.</p> <p>7 This --</p> <p>8 Q Okay.</p> <p>9 A -- document is just a list of studies.</p> <p>10 Q So you do not recall whether you relied on</p> <p>11 this document in formulating your opinion?</p> <p>12 A My --</p> <p>13 MS. O'DELL: Object to the form.</p> <p>14 A -- opinion is not based on the -- on a --</p> <p>15 a list of studies.</p> <p>16 Q (BY MR. BILLINGS-KANG) Okay. So that's --</p> <p>17 that's a -- that's a yes, you do not -- you did not</p> <p>18 rely on this document in formulating your opinion?</p> <p>19 A I -- I don't remember seeing this</p> <p>20 document. As I'm going through this document, there</p> <p>21 are a lot of studies that I reviewed that I did rely</p> <p>22 on.</p> <p>23 So I don't know if you're asking me if I</p> <p>24 relied specifically on some of the items in here</p> <p>25 that I have relied on or the -- this document</p>	<p>1 Q And what did you mean by "voluntarily</p> <p>2 guidelines"?</p> <p>3 A I -- I have read a lot about the</p> <p>4 guidelines. And it -- the idea was that the</p> <p>5 industry decided to self-regulate and to do what</p> <p>6 they could to remove the asbestos, is my</p> <p>7 understanding of what that was as opposed to being</p> <p>8 required to submit testing to document that they had</p> <p>9 done so.</p> <p>10 Q And -- and what did you rely upon for this</p> <p>11 particular sentence?</p> <p>12 A This particular sentence is repeated in --</p> <p>13 in at least half of the papers that I have read that</p> <p>14 are epidemiology papers.</p> <p>15 It's repeated in all of the news studies.</p> <p>16 It's repeated in reports by consumer organizations,</p> <p>17 by the FDA, by the recent Canadian report, which I</p> <p>18 didn't have in hand.</p> <p>19 But it's something that I -- I have read a</p> <p>20 lot -- a great deal, that there were voluntarily</p> <p>21 standards that were established by the industry.</p> <p>22 Q And so did you read any publication or</p> <p>23 whatever reliance materials that you had that</p> <p>24 described these guidelines as anything else other</p> <p>25 than voluntarily guidelines?</p>

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<p style="text-align: right;">Page 354</p> <p>1 A I -- I -- I did not. I looked for 2 documents like that. I was not able to find them. 3 Required -- requirements, I was not able to find. 4 MR. BILLINGS-KANG: Okay. That's all I 5 have. 6 MS. O'DELL: Why don't we take a short 7 break. 8 THE VIDEOGRAPHER: The time is 11:45 a.m. 9 We are now off the record. 10 (A break was taken from 11:45 a.m. to 11 12:15 p.m.) 12 THE VIDEOGRAPHER: The time is 12:15 p.m. 13 We are now back on the record. 14 EXAMINATION BY COUNSEL FOR THE PLAINTIFFS 15 BY MS. O'DELL: 16 Q Dr. Smith-Bindman, I have just a few 17 questions for you. First, during all of your work 18 in this case, was it your understanding that you 19 were serving as an expert consultant? 20 A Yes. 21 Q And you know, throughout the early 22 meetings in June, I believe, of 2017, where you met 23 with Plaintiffs' counsel, did Plaintiffs' counsel 24 provide information regarding their theories of the 25 talcum powder litigation?</p>	<p style="text-align: right;">Page 356</p> <p>1 MR. ZELLERS: Objection, form. 2 Q (BY MS. O'DELL) Let me strike that and 3 start again. Did your meta-analysis replicate what 4 had been published in the literature? 5 A The -- 6 MR. ZELLERS: Form. 7 A -- the results of my meta-analysis and the 8 previous ones are nearly identical. So yes, it was 9 a very close replication. 10 Q (BY MS. O'DELL) And you have mentioned 11 your intent to publish your -- your meta-analysis, 12 your systematic review. And I believe you testified 13 that in the published version, you would add 14 additional detail. 15 What did you mean by that? 16 A So the analysis that I have done is 17 complete. But the presentation of the results in a 18 paper would require more beautiful graphics, would 19 require explaining our inclusion and exclusion 20 criteria more fully than I did in this published 21 report. Things like that. 22 And that actually is a substantial part of 23 the writing of a scientific paper, sort of 24 explaining every step of what you did, and so I 25 would have to do more of that to publish this study.</p>
<p style="text-align: right;">Page 355</p> <p>1 A Yes. 2 Q And have you been paid by Plaintiffs' 3 counsel for all the work that you have billed in 4 this case? 5 A Yes, I have. 6 Q Okay. You have been asked a number of 7 questions about the meta-analysis, the systematic 8 review that you performed on the regular use of -- 9 of talcum powder. 10 Would you have reached your opinions in 11 this case without having performed that analysis? 12 A My systematic review ended up with the 13 same estimates as essentially all of the other 14 well-done systematic reviews. 15 And it was very helpful for me to confirm 16 the results. But yes, it's the same as the other 17 studies, and so my -- my conclusion about the 18 causality of talcum powder products and ovarian 19 cancer would be exactly the same, even without mine. 20 It just made me a little more comfortable 21 that I was certain about the -- the results 22 presented by other people. 23 Q And in a sense, the analysis that you did 24 replicated the work that had been published in the 25 -- in the literature?</p>	<p style="text-align: right;">Page 357</p> <p>1 Q Is there sufficient detail in the -- in 2 your report regarding your methodology, as well as 3 in the documentation provided in the spreadsheets 4 to -- for someone to replicate the work that you 5 have done? 6 MR. ZELLERS: Objection, form. 7 A I believe that if someone used the 8 software that we said and had the inclusion criteria 9 that we led out -- set out, that they would get the 10 -- the same results as we got. 11 And I think the fact that our review 12 provides the same results as other systematic 13 reviews sort of, you know, also supports that. But 14 yes, I think someone could easily replicate our -- 15 our analysis. 16 Q (BY MS. O'DELL) Okay. You were asked a 17 number of -- before I do that, let me ask you: Can 18 there be multiple causes of ovarian cancer? 19 A Absolutely. I -- I describe in the 20 report, a whole number of different risk factors for 21 ovarian cancer. 22 Q And in a -- in a patient -- hypothetically 23 in a patient who has a BRCA1 mutation, possibly has 24 other risk factors for ovarian cancer, and also uses 25 talcum powder products, under those circumstances,</p>

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<p>1 would talcum powder products be a contributing cause 2 of her cancer? 3 MR. ZELLERS: Objection, form. 4 A I think patients can have multiple risk 5 factors and causes of -- of cancer. Some causes, 6 you would imagine, would be quite synergistic. 7 So having both together would be worse 8 than twice having either of those alone. So it 9 would be worse than having -- it -- it would be more 10 than double the initial, because they would be 11 basically enhancing. 12 So if -- if some risk factors caused lots 13 of oxidative stress and another enhanced that 14 oxidative stress and prevented repair or cell 15 apoptosis, you would get even more impact. 16 So yes, I would say multiple risk factors 17 for most diseases occur concurrently, and sometimes 18 they enhance or are synergistic. 19 Q (BY MS. O'DELL) Can asbestos be inhaled 20 and cause ovarian cancer? 21 MR. ZELLERS: Objection, form; foundation. 22 A Absolutely. The -- the IARC 2012 report 23 was primarily on the basis of inhalation of 24 asbestos. 25 Q (BY MS. O'DELL) Can fibrous talc be</p>	<p>1 not disclosed in Dr. Smith-Bindman's expert report. 2 A Can I read? Just on page 14, The results 3 were consistent, significant, and documented a 4 strong and compelling causal association between 5 exposure to asbestos and ovarian cancer largely 6 result in the association from cohort studies of 7 women with substantial occupational exposures. 8 That -- that was the -- 9 Q (BY MS. O'DELL) Okay. Let me -- let me 10 ask you to -- to turn, Dr. Smith-Bindman, to the 11 Langseth paper that was marked as Exhibit 30 by 12 counsel for J&J. 13 And specifically to turn to page 2 of the 14 paper to Figure 1. 15 A Yes. 16 Q You were asked a number of questions about 17 whether the studies that had confidence intervals 18 that cross one were essentially by chance. In other 19 words, they -- they did not speak to a potential 20 increased risk in ovarian cancer as a result of 21 talcum powder use. 22 Are the -- what's your analysis of those 23 studies and whether, as counsel put it, it was 24 equivalent to a coin toss? 25 A So if there was no relationship between</p>
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<p>1 inhaled and cause ovarian cancer? 2 A I -- 3 MR. ZELLERS: Objection, form; foundation. 4 A -- yes. 5 Q (BY MS. O'DELL) And what's your basis for 6 that statement? 7 MR. ZELLERS: Same objections. None of 8 this was in her report. None of this has been in 9 her opinions. 10 These are all new opinions. So inhalation 11 has not been any part of her testimony or her 12 opinion. 13 MS. O'DELL: Inhalation is mentioned in 14 her report. 15 A I -- I -- you know, the -- the chapter on 16 asbestos and occupational exposure and IARC report 17 is -- is about inhalation. 18 I'm not sure if I -- I was explicit about 19 the route, but that is where the data come from for 20 asbestos, as well as fibrous talc. 21 And those articles talk about the fact 22 that there might be other exposures in addition, but 23 they're primarily inhalation studies. 24 MR. ZELLERS: Again, object to what the 25 defense views as a completely new opinion that was</p>	<p>1 ovarian cancer and exposure to talcum powder 2 products, you would expect the forest plot in 3 Figure 1 to have half of the point estimates be 4 above one, saying there's a risk; and half of the 5 point estimates being below one, saying there isn't 6 a risk. 7 In fact, every one of the studies on this 8 table is at or above one. It's to the right. So to 9 get that by chance is highly, highly, highly 10 unlikely. 11 The best estimate is -- the point estimate 12 in all of those are very different than one. 13 And so to call that by chance doesn't make 14 sense. The fact that for an individual study, the 15 confidence interval overlap one doesn't mean it's by 16 chance. 17 So again, by chance would mean half the 18 studies have a positive association, half have a 19 protective. 20 And in fact, every one of the studies has 21 a value that's either substantially greater than one 22 or just a little greater than one. 23 Q Okay. You were asked questions about 24 starting -- in reference to the Langseth paper you 25 were asked questions about the -- the pooled odds</p>

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<p>1 ratio for hospital-based studies and the focus on 2 that finding being that it was not a statistically 3 significant increased risk. 4 Did the Berge paper also look at a pooled 5 analysis of the hospital-based studies? 6 A She did. If you look at Table 2, Table 2 7 shows the results of the case-control studies that 8 were hospital based versus community based. 9 And those individual group of 10 hospital-based studies are statistically 11 significant. 12 But I would point out that in this case 13 the -- they report the relative risk of a hospital 14 based versus community based. They're relatively 15 similar. They're both significant, and they're 16 relatively similar, which is what I concluded from 17 Langseth. They're very similar. 18 Q Okay. You were asked about studies 19 relating to migration. And the specific -- the 20 specific question, as I wrote it down was: Is there 21 a study that demonstrates talc on the -- applied to 22 the perineum, traveling to the -- or migrating to 23 the ovary, and you said, No. 24 What evidence are you relying on to 25 support your opinion that talcum powder can migrate</p>	<p>1 There have been studies of sperm, both 2 living and dead, going in both directions. So it's 3 not just the mobile sperm, but the dead sperm. 4 Carbon particles -- you know, a tiny 5 study -- but have been shown to move -- radioactive 6 material has been seen to move. Material on gloves 7 has been seen. 8 So it's a wide-open system. The idea that 9 we think of that as being a barrier system is just 10 false. 11 Now, I don't know of an individual study 12 that has put talc on the perineum. I think that's, 13 unfortunately, not an ethical study to do. And I 14 don't know of such a study or why you would do such 15 a study. 16 But to think that there's any barrier 17 between the perineum and the vagina makes no sense 18 whatsoever. 19 Q Let me transition to talk about 20 inflammation for a moment, and specifically 21 inflammation as a cause of ovarian cancer first. 22 What evidence are you relying on to 23 support your opinion that inflammation -- chronic 24 inflammation causes ovarian cancer? 25 A Okay. So there's an enormous amount of</p>
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<p>1 when applied -- applied to the genital area to the 2 ovary? 3 A So I was asked a very narrow question, is 4 there a study that talks about transport from the 5 perineum. 6 But in fact, there is extensive evidence 7 that particles from the perineum could get to the 8 ovary and do get to the ovary. 9 And part of that is the perineum is 10 basically equivalent to the vagina. It is one open 11 system to the ovary. 12 And so my evidence for that is 13 several-fold. First, I'm a clinical radiologist, 14 and I do a lot of procedures in women where I am 15 putting catheters in the vagina and injecting fluid 16 that goes to the uterus, to the tubes. I watch the 17 fluid spill. It's a wide-open system. 18 Occasionally patients have complications 19 that don't let me do that, and I might inject fluid 20 literally on the perineum to get a backlash to the 21 ovaries. And it's a wide-open connected system. 22 All of our textbooks talk about it being a 23 bi-directional system. You know, infection goes 24 both directions. Retrograde menstruation and 25 menstruation go both directions.</p>	<p>1 literature that understands what we see when there's 2 inflammation, what kind of changes you see on a 3 cellular level. 4 So you see increase in pro oxidation, a 5 reduction in antioxidation. You see increase in 6 cell turnover, reduction in cell death, expression 7 of inflammatory agents, cellular changes at the DNA 8 level that leads to greater expression. 9 We -- we understand those pathways. And 10 those pathways occur both with talc exposure and in 11 the setting of things that cause ovarian cancer. 12 So I -- in my reference list, I reference 13 a whole bunch of references -- Saed references, 14 Shawn (phonetic) references, Ness references. 15 There's really enormous numbers of references. 16 I -- in my documents I have Shukla 17 references, Buz'Zard references, Hamilton references 18 that talk away sort of these inflammatory pathways 19 and biologic mechanisms that lead to changes that go 20 along with inflammation. 21 Q I know you have reviewed Dr. Saed's 22 research in regard to whether talcum powder causes 23 inflammation in vitro. 24 First, let me ask you this: Does 25 Dr. Saed's work support the conclusion that</p>

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<p style="text-align: right;">Page 366</p> <p>1 Johnson's baby powder causes inflammation? 2 MR. ZELLERS: Objection, form. 3 A So Saed specifically looked at Johnson 4 baby powder, so his results specifically pertained 5 to Johnson baby powder. 6 He looked at several different measures 7 that -- I have just mentioned inflammation. So he 8 looked specifically at oxidative stress, the up 9 regulation or down regulation of -- 10 THE COURT REPORTER: The? 11 A -- up regulation or pro oxidants, down 12 regulation of antioxidants. He looked at cell 13 proliferation. He looked at SNPS point mutations 14 that are associated with this. 15 THE COURT REPORTER: Snips? 16 A S N P S, SNPS. 17 THE COURT REPORTER: Because you're facing 18 that way, and the mic is here. Thanks. 19 A And showed substantial changes to talcum 20 powder to all of these. I -- I was really quite 21 impressed with the consistency in these markers of 22 inflammation. 23 Some of them overlap clinical markers we 24 use. Like CA125 went up very strongly just like it 25 goes up for ovarian cancer.</p>	<p style="text-align: right;">Page 368</p> <p>1 do that. That's beyond me. But that's what this 2 whole model is, to try to help you understand what 3 the effect mechanistically is from these changes. 4 Q (BY MS. O'DELL) And is the use of that 5 model in scientific research generally accepted? 6 A Highly. 7 MR. ZELLERS: Objection, form. 8 A My understanding is that is the basis for 9 much of the research that comes -- that happens at 10 my research institution. 11 Q (BY MS. O'DELL) Just to make sure that the 12 record is clear, Dr. Smith-Bindman, in -- I asked 13 the question: Is the use of that model in 14 scientific research generally accepted? I'm not 15 sure your answer came through. What's your answer? 16 MR. ZELLERS: For your -- just objection, 17 form. Go ahead. 18 A Yes. I -- I said that that's a very 19 common model at UCSF. 20 Q Okay. 21 MS. O'DELL: I have nothing further. 22 Thank you. 23 MR. ZELLERS: Let's take a break for a 24 couple of minutes. 25 THE VIDEOGRAPHER: The time is 12:34 p.m.</p>
<p style="text-align: right;">Page 367</p> <p>1 So he very clearly showed this. And the 2 results he showed were not different than those that 3 Shukla showed, that Buz'Zard showed, that -- the 4 expression in genes. 5 He -- he just had it in a very compelling 6 experiment where he showed dose response, where he 7 showed the control didn't have the changes, but that 8 the talc powder products did have the changes. 9 And so he identified, in this cellular 10 cell line model, all of the changes that you would 11 expect from inflammation. So I think the results 12 were very compelling. 13 I -- I was asked if kind of that 14 experiment has any relevance in humans. And I would 15 say it would be nice to do that experiment in 16 humans. 17 But you can't do that experiment in 18 humans. And that's what -- 19 THE COURT REPORTER: Wait. 20 A -- you can't do such an experiment in 21 humans. So -- so that is what sort of cellular 22 studies are -- are meant to approximate. 23 There's no direct translation, so how much 24 you put in the cell versus how much you put in the 25 patient, I -- you know, I don't know how you would</p>	<p style="text-align: right;">Page 369</p> <p>1 We are now off the record. 2 (A break was taken from 12:34 p.m. to 3 12:41 p.m.) 4 THE VIDEOGRAPHER: The time is 12:41 p.m. 5 We are now back on the record. 6 EXAMINATION BY COUNSEL FOR THE DEFENDANTS 7 BY MS. BOCKUS: 8 Q Doctor, you made a comment about the fact 9 that there can be a synergistic effect between 10 different risk factors; is that correct? 11 A Yes. 12 Q That is something that can be studied, 13 correct? 14 A Yes. 15 Q There are studies that can be designed to 16 determine whether there's a synergistic effect 17 between, say, BRCA mutation carriers and women who 18 have regularly used talcum powder -- 19 A Yes. 20 Q -- correct? 21 That study has not been done, correct? 22 A Not that I know of. 23 Q In fact, are you familiar or aware of any 24 studies that have looked for a synergistic effect 25 between regular talc use and any other risk factors</p>

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<p>1 for ovarian cancer?</p> <p>2 MS. O'DELL: Object to the form.</p> <p>3 A I would have to look through my papers</p> <p>4 with that question in mind. I know some of the</p> <p>5 papers have looked at BRCA, but I can't remember if</p> <p>6 they sort of stratified the results by -- with or</p> <p>7 without BRCA, so I -- I'm not sure of the answer to</p> <p>8 that.</p> <p>9 I was more speaking about, from work that</p> <p>10 I do, the idea of synergy between risk factors. And</p> <p>11 one of those is BRCA and radiation exposure. So</p> <p>12 I -- I -- I meant generally it can be the case. I</p> <p>13 didn't mean to suggest we know what it is for this.</p> <p>14 Q (BY MS. BOCKUS) Okay. Then you spoke</p> <p>15 about the female reproductive system being a</p> <p>16 wide-open system.</p> <p>17 What procedure are you doing when you are</p> <p>18 putting fluid on a women's perineum to see if it</p> <p>19 goes to the ovaries?</p> <p>20 A I apologize. So the primary procedures</p> <p>21 would be a hysterosonogram, which we're putting</p> <p>22 water into the uterus and the tubes mostly to look</p> <p>23 for patency.</p> <p>24 But it turns out we end up needing to do</p> <p>25 procedures in postop patients, not infrequently,</p>	<p>1 Q Do you know if anything about what you</p> <p>2 just described has any correlation to the way in</p> <p>3 which women use talcum powder in their perineal</p> <p>4 region?</p> <p>5 MS. O'DELL: Object to the form.</p> <p>6 A I -- I don't know what -- how women use</p> <p>7 talcum powder on their perineum.</p> <p>8 Q (BY MS. BOCKUS) Do you know what</p> <p>9 percentage of sperm that are placed in a women's</p> <p>10 vagina make it to the ovaries?</p> <p>11 A Only from child cartoons that make it seem</p> <p>12 like it's a competitive race. But percentage-wise, I</p> <p>13 don't know.</p> <p>14 Q Do you have any reason to believe that</p> <p>15 talc makes it from the vagina to the ovaries in</p> <p>16 greater percentage than sperm?</p> <p>17 A I -- I -- I would guess that that's not</p> <p>18 the case.</p> <p>19 MS. BOCKUS: That's all I have.</p> <p>20 MR. ZELLERS: I have just a couple.</p> <p>21 EXAMINATION BY COUNSEL FOR THE DEFENDANTS</p> <p>22 BY MR. ZELLERS:</p> <p>23 Q Dr. Smith-Bindman, did you discuss with</p> <p>24 Plaintiffs' counsel, calling Dr. Hall on our break</p> <p>25 between yesterday's first session and today's</p>
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<p>1 where we might be looking for connections between</p> <p>2 different structures, preop or postop.</p> <p>3 In the ballpark of 10 percent of women to</p> <p>4 20 percent have cervical stenosis, and you can't</p> <p>5 catheterize.</p> <p>6 Or there might be some reason we don't</p> <p>7 want to catheterize or put the tubes in the vagina.</p> <p>8 We might put the tube directly on the perineum and</p> <p>9 see if we can create kind of a -- a way to keep,</p> <p>10 let's say, a balloon in place and then inject in a</p> <p>11 retrograde fashion.</p> <p>12 So it feels like it comes out probably</p> <p>13 every couple of months. But we're actually pretty</p> <p>14 far from the cervix. And we're injecting usually</p> <p>15 water or sometimes contrast and then looking mostly</p> <p>16 with ultrasound, but sometimes with fluoroscopy.</p> <p>17 Q And when you say "inject," that means with</p> <p>18 some degree of pressure, you're putting the water or</p> <p>19 other fluid into the vagina?</p> <p>20 A There is some degree of pressure, yes.</p> <p>21 Q And when you do that, is the patient's</p> <p>22 head lower than her hips?</p> <p>23 A Not -- not usually, no.</p> <p>24 Q Is she on her back?</p> <p>25 A Yes.</p>	<p>1 session?</p> <p>2 MS. O'DELL: I'm going to ask -- ask</p> <p>3 you -- instruct you not to answer questions</p> <p>4 regarding discussions with counsel.</p> <p>5 MR. ZELLERS: The defense agreed to split</p> <p>6 this deposition of Dr. Smith-Bindman over two days</p> <p>7 on the expressed condition that the extended break</p> <p>8 not be used for preparation.</p> <p>9 The witness and Plaintiffs' counsel</p> <p>10 violated that understanding. Further, it's entirely</p> <p>11 inappropriate for an expert witness to consult with</p> <p>12 a consulting expert during a break.</p> <p>13 We move to strike all of</p> <p>14 Dr. Smith-Bindman's testimony and will take the</p> <p>15 issue to court.</p> <p>16 MS. O'DELL: The record is clear that</p> <p>17 counsel did not speak with Dr. Smith-Bindman last</p> <p>18 night. There was no preparation done between the</p> <p>19 conclusion of the deposition yesterday and the</p> <p>20 beginning of the deposition this morning. I think</p> <p>21 the record has been clear on that.</p> <p>22 That was -- we agreed to do that. We had</p> <p>23 not -- we were not compelled to do that. Because as</p> <p>24 counsel is aware, the deposition protocol allows</p> <p>25 both parties, when they're putting up their</p>

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Exhibit 37

**UNITED STATES DISTRICT COURT
DISTRICT OF NEW JERSEY**

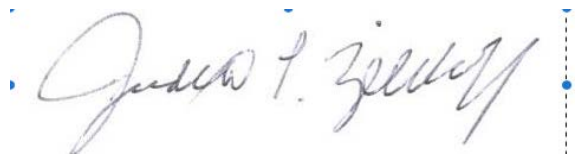
**IN RE JOHNSON & JOHNSON
TALCUM POWDER PRODUCTS
MARKETING, SALES PRACTICES,
AND PRODUCTS LIABILITY
LITIGATION**

MDL NO. 16-2738 (FLW) (LHG)

THIS DOCUMENT RELATES TO ALL CASES

**RULE 26 EXPERT REPORT OF
JUDITH ZELIKOFF, PHD**

Date: November 16, 2018

A handwritten signature in blue ink, reading "Judith T. Zelikoff", is positioned above a horizontal line. The signature is written in a cursive style. To the right of the signature, there is a vertical dashed line with a blue dot at the bottom.

Judith Zelikoff, PhD

I. BACKGROUND AND QUALIFICATIONS

I received my Ph.D in Experimental Pathology and Immunology at Rutgers: NJ Medical School (formerly known as University of Medicine and Dentistry of NJ) in 1982, after receiving a Master's degree from Fairleigh Dickinson University in Microbiology. My post-doctoral training was in toxicology at the NYU School of Medicine, Department of Environmental Medicine as a National Heart Lung Blood Institute (NHLBI) fellow.

I am currently a tenured-professor in Toxicology at NYU. As part of the NYU NIEHS (National Institute of Environmental Health Science) Center of Excellence, I serve as Director of the Community Engagement Core. In this capacity, I engage with environmentally-impacted underserved communities throughout New Jersey and New York to better engage the community to achieve long-term and sustainable outcomes, processes, relationships, discourse, decision-making, and implementation regarding environmental health. These goals are carried out through town hall meetings, focus groups, listening sessions, forums on relevant environmental concerns, surveys, as well as outdoor and indoor measurements of toxic metals such as lead, cadmium, mercury, and arsenic in water, air, and soil. I also provide service to the NYU School of Medicine as a member of the Grievance Committee, Institutional Animal and Use Committee (IACUC) and as an NYU Senator representing the School of Medicine.

I have served in numerous leadership positions in the field of toxicology, including NIH Study Sections, United Nations Environmental Programme, NASA boards, and National Academy of Science Panels (i.e., Institute of Medicine, National Research Council and Engineering, and Medicine's Board on Earth Sciences and Resources), as well as Environmental Protection Agency study sections and advisory boards concerning the toxic effects of air pollution, metals, and alternative tobacco products. Furthermore, I served for two years (2010-2012) as a member of the National Toxicology Program (NTP) Board of Scientific Advisors. In this capacity, I reviewed documents and provided input and guidance on the toxicity of various chemicals that were nominated for review and sent to the NTP for study and/or discussion. In some cases, we also decided on the carcinogenicity of specific compounds. I was not part of the NTP 10 ROC or 12 ROC, both of which deferred the decision on talc.

In addition, I presented about 150 international/national papers in the areas of toxicology and environmental and public health. I have organized several international toxicology meetings, served as editor for several toxicology/environmental public health books and authored numerous book chapters in the same areas. I have over 125 publications and book chapters in the area of immunotoxicology (for which I received a Lifetime Achievement Award from the Society of Toxicology), air pollution toxicology, metal toxicology, immunotoxicology, and developmental and reproductive toxicology associated with inhaled metals, mixtures, nanomaterials, dusts (i.e., World Trade Center Dust), and tobacco/nicotine toxicology.

I have held numerous executive positions in the Society of Toxicology (SOT) which includes three years as Secretary on the SOT Executive Council and one year as Chair of the Education Committee and Committee for Diversity Initiatives Committees. I have also provided leadership for four individual SOT Specialty Sections (SS). I have served as President of the Immunotoxicology, Metals and Ethical, Legal, Forensic and Societal Issues Specialty Section and currently serve as Senior Councilor of the Inhalation and Respiratory Specialty Section. I have received three major SOT awards including the Mentorship Award from “Women in Toxicology”, Global Host award and in 2018, Education award for meritorious teaching skills in toxicology. As a teaching scholar, I have taught and continue to teach toxicology on a global level in such countries as Thailand, Nigeria, South Africa, Tasmania and New Zealand.

My education, training and publications are further set out in my Curriculum Vitae, which is attached to this report as an **Exhibit A**.

II. MANDATE AND METHODOLOGY

Mandate: I was asked to review the scientific literature and assess whether there is a biologically plausible explanation for the increased risk of ovarian cancer with the perineal use of talcum powder products.

The notion of biological plausibility is multi-factoral. As a part of my analysis, while considering the totality of the evidence, I evaluated the genital use of talcum powder products, the routes of exposure by which talcum powder could reach the ovaries, the composition of the talcum powder products, the biological and toxicological effects of talcum powder, and the potential mechanisms of carcinogenesis. Biological plausibility does not mean proof of mechanism, but rather whether what is known about the products is consistent with a cause and effect relationship.

I performed an independent, comprehensive literature review using research databases and search engines including PubMed, ToxLit and Google to identify relevant literature. The keywords/phrases used initially for searching, included: talc, talcum powder, talc and cancer, talc and toxicity, talc and toxicology, ovarian cancer, oxidative stress, talc and ovarian cancer, animal models and talc, talc powder and the immune response and talc chemical structure. Keywords and phrases expanded upon those terms in later searches.

More than 300 publications (research papers, reviews, abstracts, reports, documents) and book chapters from the 1960s to the present were identified as having some relevancy for the talc-ovarian cancer topic. Following closer scrutiny of these publications, between 200-250 research papers, scholarly reviews, abstracts, documents, reports were found critical for informing my opinion. Toxicological studies, including *in vivo*, *in vitro* and *ex vivo* investigations, were the topics most appropriate for my area of expertise. In addition, I have reviewed depositions and numerous documents, internal memorandum

and published and unpublished studies and testing results that I have found in my own searches, documents provided by attorneys, and documents that I requested. A list of materials and data considered for this report are attached as **Exhibit B**.

My opinions below are based upon my experience as a toxicologist and research scientist and have been reached through employing the same scientific methodology and rigor that I employ in my academic research and professional duties. To my knowledge, I considered and evaluated the majority of all available relevant studies in the process of evaluating the literature, including those that reported an elevated risk of ovarian cancer with exposure to talc and those where other chemicals were reported within talc-based body powders, including those that did not find an increased risk. The same approach was used in evaluating the animal data and the mechanistic data.

III. TALC

Primary talc deposits are found on almost every continent around the world¹. Talc is commonly formed by the hydrothermal alteration of magnesium- and iron-rich rocks (ultramafic rocks) and by low-grade thermal metamorphism of siliceous dolomites. Talc is the softest mineral on earth, mined around the world for use in a wide variety of products personal, cosmetic or industrial in nature. The word “talc” can refer to two things. The first is a mineral and the second is a commercially available product that can be used both industrially and in pharmaceuticals and cosmetics. For this report, when talking about the former, I use the term “mineral talc,” and when talking about the latter, I use the term “talcum powder products.” Johnson & Johnson talcum powder products are classified as cosmetic talc. Dermal contact (including perineal application of talcum powder products) is a primary route of human exposure, while inhalation also represents a route of exposure for talc/talcum powder products.

As a mineral, talc corresponds to the chemical structure of hydrous magnesium silicate with a formula of $\text{Mg}_3\text{Si}_4\text{O}_{10}(\text{OH})_2$ and a theoretical chemical composition, expressed as oxides, of 31.7% by weight magnesium oxide (MgO), 63.5% silicon dioxide (SiO_2) and 4.8% water (H_2O). Talc belongs to the silicate subclass phyllosilicates and is known as a sheet silicate. It is the softest mineral on Mohs’ hardness scale, and its structure and chemical bond arrangement is such that it is easily broken into thin sheets. The structure consists of three sheets that are octahedrally coordinated magnesium hydroxide groups (brucite layer) layered between 2 layers of tetrahedrally linked silica layers. The apical oxygen atom positions of the tetrahedral layers are shared with one of the oxygen atom positions of the octahedral layer. The composite sheets repeat every 9.4 angstroms and the triple-sheet crystalline units are held together by van der Waals forces. Talc particles are normally plate-like in shape, but may form mineral fibers, as discussed below.

¹ <https://minerals.usgs.gov/minerals/pubs/commodity/talc/mcs-2017-talc.pdf>

Small amounts of aluminum and ferric (III) iron can substitute for silicon in talc tetrahedral sites. Trace amounts of nickel and small to moderate amounts of ferrous (II) and ferric (III) iron, aluminum and/or manganese can substitute for magnesium in talc octahedral sites. Additionally, talc deposits may contain varying amounts of quartz, nickel, chromium and cobalt, as well as asbestos or asbestos-forming minerals including amphibole (tremolite, actinolite, antigorite and anthophyllite) and serpentine (chrysotile) (Cralley, 1968; Lockey, 1981; McCarthy 2006; Rohl, 1976). The pH of cosmetic talcs are usually alkaline (8.0-9.5) and are insoluble in water, cold acids or in alkalis.

Talc powder particle size depends on the process used to make the powder. Johnson and Johnson's analysis of particle size in talcum powder shows particles range on average from 0.8 μm to over 50 μm , with a median particle size of 11.39 μm , where approximately 43.9% of particles are less than 10 μm (JNJ TALC00878141).

A. Fibrous Talc

As a mineral, talc is most commonly found in plate-like form, but may also form as true mineral fibers that are asbestiform (IARC 2010, IARC 2012). Asbestiform talc (also known as fibrous talc) is different from talc containing asbestos. Fibrous talc fibers are very long and thin and occur in parallel bundles that are easily separated from each other by hand pressure (IARC Monographs, 2010). The 2010 IARC clearly states that the term 'asbestiform fiber' means any mineral, including talc, when it grows into an asbestiform habit. In its fibrous form, talc has been classified as a Group I, known carcinogen (IARC 1987 Supp 7; IARC 2010; IARC 2012). OSHA considered fibrous talc exposure limits to be equivalent to those of asbestos (OSHA, 1972). In 2010, IARC expanded the Group 1 designation ("known carcinogen") from "talc containing asbestiform fibers" to "talc containing asbestos or other asbestiform fibres." (IARC, 2010). Additionally, the American Conference of Governmental Industrial Hygienists (ACGIH) clarifies that "talc may also take the form of long thin fibers (fibrous talc) and can occur in bundles that are easily separated (asbestiform talc). Asbestiform talc should not be confused with talc containing asbestos..." (ACGIH, 2010).

Asbestiform talc fibers have been reported by Johnson & Johnson and Imerys to be found in: mines from which ore for Johnson & Johnson talcum powder products were sourced; in talcum powder used in Johnson & Johnson talcum powder products; and in the Johnson & Johnson talcum powder final product.²

Recent TEM testing on historic samples of Johnson's Baby Powder from 1978 showed the presence of fibrous talc in the product (Longo & Rigler, Feb 2018 MAS Report). Additional TEM testing of 30 samples of J & J baby powder and Shower to Shower dating from a span of many years resulted in a finding of fibrous talc in 15 samples (Longo & Rigler, Aug 2017 Expert Report).

² See also: IMERYS477879 (fibrous talc in Grade 66 Q1 composite); JNJ 000269848 (talc needles found in medicated powder 1971, see with TEM results in JNJ 000281921); JNJ 000245002 (Fibrous talc in Hammondsville mine 1970)) .

IV. ASBESTOS

Asbestos, like talc, is a naturally occurring silicate mineral, but with a different crystal structure (Mossman & Churg, 1998). Asbestos is a generic name referring to a group of naturally occurring mineral silicate fibers. It is recognized as a known human carcinogen by the U.S. Occupational Safety and Health Administration (OSHA), the U.S. Environmental Protection Agency (USEPA) and the National Toxicology Program (NTP)(OSHA, 2014; USEPA, 1995; NTP, 2016). The National Institute for Occupational Health (NIOSH) has stated there is no safe level of asbestos and the American Conference of Governmental Industrial Hygienists (ACGIH) characterizes it as a “confirmed human carcinogen” (NIOSH, 1980; ACGIH, 2017). All forms of asbestos are Group 1 carcinogens (carcinogenic to humans)(IARC, 2012).

The U.S. EPA defines asbestos by limiting the term to 6 specific fibrous minerals from two distinct groups: chrysotile (from the Serpentine group); and amosite, crocidolite, tremolite, actinolite and anthophyllite (from the Amphibole group). “Asbestiform” describes the pattern of growth of a mineral that is referred to as a “habit” (IARC, 2010). Minerals with a “non-asbestiform” habit have crystals that grow in two or three dimensions, and “cleave into fragments, rather than breaking into fibrils” (*Id.*). Chrysotile occurs in the asbestiform habit, whereas, of the amphiboles, amosite and crocidolite occur only in the asbestiform habit, and tremolite, anthophyllite and actinolite can occur in asbestiform or non-asbestiform habits. OSHA defines an asbestos fiber as having a length > 5mm and a length:width aspect ratio of 3:1, whereas the USEPA definition incorporates the aspect ratio of > 5:1 (OSHA, 1992; USEPA, 1987).

While amphibole and serpentine asbestos may have fibrous habits, they have very different forms. The amphiboles are double-chain silicates also called inosilicates. The basic structural unit is $(\text{Si}_4\text{O}_{11})^{6-}$ with side groups that are responsible for the overall amphibole structure. Amphiboles are distinguished from one another by the amount and positioning of metal atoms including: sodium, calcium, manganese, magnesium, iron(II), iron(III) and aluminum. Traces of these types of asbestos are extracted when other minerals are being mined and, due to inefficient or non-existent separation techniques, are ultimately incorporated into the final product. Even incidental contamination by amphibole forms of asbestos is hazardous enough to cause asbestos-related illnesses (Rohl & Langer, 1976).

The serpentine group of minerals has the formula $\text{Mg}_3\text{Si}_2\text{O}_5(\text{OH})_4$ and the structure resembles a bending sheet. Chrysotile is the only one in which the sheets are bent to form continuous tubes, which gives the mineral the fibrous habit related to asbestos. Chrysotile is very flexible and less likely to be “friable” than the amphiboles. Friability of asbestos is generally defined as the ability to easily be turned into a dust with finger pressure. It is this friability that can release asbestos fibers and potentially result in health problems.

A. Asbestos in Talc

Associated minerals found in commercial talc products vary from deposit to deposit depending on the formation conditions. The most common minerals associated with talc include chlorite, magnetite, dolomite, calcite, mica, quartz and fluoapatite (Fiume et al., 2015). In its natural form, some talc also contains asbestos, classified as a Group I, “known carcinogen” by IARC (IARC Monographs, 1973, 1977, 1987, 2012). Amphiboles and serpentine fibers have been associated with many talc deposits (Van Gosen, 2004; Marconi and Verdel, 1990; Lockey, 1981; Rohl and Langer, 1974; Gamble et al., 1979; Kleinfeld et al., 1973, 1974; Pooley, 1972 (JNJ000319762); Chidester, 1968). The close proximity of asbestos and talc in mineral deposits makes extraction of either material alone difficult, if not impossible. (Rohl and Langer, 1974; IARC, 2010; Dion et al. 2010³).

Cralley (1968) analyzed twenty-two commercially available cosmetic talcum products (manufacturers not reported). Authors reported the fiber content ranged from 8% - 30% (by count) with an average of 19% and that the fibrous material was predominantly fibrous talc. Pooley and Rowlands (1975) analyzed twenty-seven talc powders (cosmetic and industrial) and detected tremolite fibers in three samples.

Because asbestos is a known carcinogen, its presence in cosmetic talc is unacceptable (FDA, 2012; FDA 2015). The former Director of National Institute for Occupational Safety and Health (NIOSH) and former President of Industrial Minerals Association – North America (IMA-NA) stated in a recent deposition that if there were a fiber of asbestos in talcum-based products it would “certainly” provide a biologically plausible mechanism for increased lung disease, and that he suspected it would also have a “similar mechanism of disease in other tissues and organs” (Deposition of Robert Glenn, October 18, 2018, 341:15-342:3).

In 1976, specifications were developed for cosmetic talc requiring that no detectable fibrous, asbestos mineral be present (CTFA, 1990; Fiume, 2015). The talc industry, and specifically Defendants, developed a “zero tolerance” standard for asbestos in talc (IMERYS 170006; JNJ 000383662; JNJ 000001918). Despite this standard, the presence of asbestos in cosmetic talc has been reported in the literature, and Johnson and Johnson indicated in a letter in 1973 that “asbestos-form particles cannot be removed from talc” and that the “Johnson & Johnson process for beneficiating Vermont talc...will not guarantee a zero tolerance for elongated particles” (JNJ 000233691). In 1976, Rohl et al. tested 20 different talcs and powders including 20 body powders, baby powders, facial talcums, and also one pharmaceutical talc to determine their mineralogical and chemical composition. Where known, all were formulated prior to 1973. Of the 20 products, 9 contained detectable amounts of tremolite and anthophyllite, principally asbestiform, while some also contained fragmented forms of these minerals. The amounts ranged from tenths of a percent to over 14% by weight; two contained detectable amounts of chrysotile asbestos fiber. Eight samples contained quartz, seven ranging from 2 to 5%, with one as high as 35%. Analyses showed that the consumer products examined were rarely the pure mineral talc, but rather were mixtures of various minerals.

³ Available online at: <http://www.irsst.qc.ca/media/documents/PubIRSST/R-755.pdf>

In 1984, Paoletti et al. performed studies by electron microscopy to assess asbestos contamination in industrial and cosmetic talcs from the Italian market and the European Pharmacopoeia (Paoletti, 1984). Nine of the 25 pharmaceutical and cosmetic grade talcs contained tremolite fibers, with total percent asbestos concentrations ranging from 0.4% - 22%. About half of the talc powders revealed the presence of asbestos: in five samples chrysotile (a serpentine asbestos) was present, the others contained tremolite and anthophyllite (an amphibole asbestos).

Cosmetic and pharmaceutical talc products from deposits in Vermont, Montana, North Carolina and Alabama were examined and tested positive for asbestos (Blount, 1991). The investigator of that study recently affirmed the samples included Johnson & Johnson baby powder, purchased off the shelf (Deposition of Alice Blount, PhD, April 13, 2018). The early analytical methods used to measure asbestos fibers before 1990 were not very sensitive and thus it appears that extrapolation of the levels of asbestos from counts measured before this date could have been conservative (Blount, 1991).

In a study that examined the amphibole asbestos content of commercial talc deposits in the USA, Van Gosen et al. (2004) found that the talc-forming environment directly influenced the amphibole and amphibole-asbestos content of the talc deposit. Specifically, the study found that contact metamorphic talcs showed a strong tendency to contain amphiboles, and regional metamorphic talc bodies consistently contained amphiboles, which display a variety of compositions and habits (including asbestiform). In a German study (Mattenklott, 2007), the author examined the presence of asbestos in talc powder and found that in one-quarter of the 57 talc powder samples tested, asbestos could be detected. Two samples contained quantities exceeding 0.1 weight percent which could reach a value of 10,000 fibers/m³. This weight percent is, in some cases, half that reported by Johnson & Johnson in their internal documents, as seen in the corporate depositions reported below.

Defendants have claimed that asbestos has been “eliminated” from cosmetic talc products.⁴ However, there is substantial evidence that talcum powder products still contain asbestos, recognized as a Group 1 carcinogen. During the recent deposition of John Hopkins (Johnson and Johnson corporate representative), Mr. Hopkins affirmed testing results showing the presence of asbestos in mines from which talc ore was taken for use in Johnson & Johnson baby powder products, processed talc used in Johnson & Johnson baby powder products, and in complete Johnson & Johnson baby powder products. Those results may be found at Exhibit 28⁵ of Dr. Hopkins’ deposition. Additional examples of testing performed by and commissioned by Johnson and Johnson and Imerys may be found at Exhibit 47 to the deposition of Julie Pier, corporate representative of Imerys.⁶

In 1975, McCrone Associates also confirmed the presence of amphibole particles, alone and in bundles as seen in Defendants’ internal documents (JNJMX68_000012745). In 2004, a television station reported that Johnson’s Baby Powder had been analyzed and found anthophyllite asbestos at 0.2% (JNJ 000089413). A 1972 Johnson & Johnson document demonstrates the presence of up to 5% chrysotile in

⁴ PCPC Submission to FDA, July 2009 – “Since the early 1970’s, the relevant industries voluntarily eliminated asbestos contamination from talc products.”

⁵ Ex. 28, John Hopkins Dep. (Aug. 16 & 17, 2018; Oct. 17, 2018; and Nov. 5, 2018).

⁶ Ex. 47, Julie Pier Dep. (Sept. 12 & 13, 2018).

Johnson's Baby Powder and Shower to Shower samples (JNJ 000232996). These data clearly demonstrate the possibility for women who used talcum powder during these dates to have had exposure to this ovarian carcinogen.

Recent TEM testing on historic samples of Johnson & Johnson baby powder from 1978 showed the presence of fibrous anthophyllite in the product. (Longo and Rigler, 2018; Ex. 47, Pier Dep.). Additional TEM testing of 30 samples of Johnson & Johnson baby powder and Shower to Shower ranging in production date over a span of many years resulted in a finding of amphibole asbestos (tremolite, anthophyllite, richterite and actinolite) in 17 samples. (Longo and Rigler, 2017). Additionally, I have reviewed a recent report prepared by Dr. William Longo and Dr. Mark Rigler that reports that talcum powder products manufactured by Johnson & Johnson's Baby Powder and Shower to Shower have contained and continue to contain asbestos and talc containing asbestiform fibers (e.g. talc occurring in a fibrous habit).⁷ These results were obtained from testing talcum powder product samples manufactured during the period of the 1960s through the 1990s. Results showed 37 of 56 samples tested contained tremolite and/or anthophyllite asbestos, and 41 of 42 samples tested contained fibrous talc.

The substantial evidence of the presence of asbestos and fibrous talc in talcum powder products provides a biologically plausible explanation for the increased risk of ovarian cancer associated with the perineal use of talcum powder products.

V. HEAVY METALS

A. Properties of Heavy Metals

Nickel is classified by IARC as a human carcinogen (Group 1) (IARC, 1973, 1976, 1979, 1982, 1987, 1990). The exact mechanisms of nickel-induced carcinogenesis are not known, but likely involve genetic and epigenetic routes. Nickel (II)-induced genotoxicity may be aggravated through the generation of DNA-damaging reactive oxygen species (ROS) and the inhibition of DNA repair by this metal. Nickel exposure also causes a broad spectrum of epigenetic effects. Contact with nickel compounds can cause a variety of adverse effects on human health (Zambelli and Ciurli, 2013).

Nickel ions have been shown to cause single-strand DNA breaks and DNA-protein crosslinks (Patierno, 1985). In a study by Patierno (1985), Chinese hamster ovary cells were exposed to NiCl₂, and nickel-induced DA-protein crosslinking appeared in late S phase of the cell cycle (*Id.*). Authors associate these alterations as an early event in the process of nickel transformation (*Id.*).

Contact with nickel compounds can cause a variety of adverse effects on human health, such as nickel allergy in the form of contact dermatitis, lung fibrosis, cardiovascular and kidney diseases and

⁷ Expert Report of William E. Longo, PhD and Mark W. Rigler, PhD (Nov. 14, 2018).

cancer of the respiratory tract. Chronic non-cancer health effects may result from long-term exposure to relatively low concentrations of pollutants (Duda-Chodak and Blaszczyk, 2008). Although the accumulation of nickel in the body through chronic exposure can lead to a number of diseases, the most serious concerns relate to nickel's carcinogenic activity. Increased risks of malignant tumors, such as nasal and sinusoidal cancers, and cancers of the lung and larynx have been noted (IARC, 1987). The marked differences in the carcinogenic activities of various nickel compounds most likely reflect the differences in their uptake, transport, distribution and retention, and ultimately—the capacity to deliver nickel (II) ions to specific cells and target molecules.

In experimental animals, nickel compounds induce tumors at virtually all sites of application (Denkhaus, 2002; IARC, 1987; Zabmelli, 2013). The routes of administration that were shown to produce tumors include inhalation, intramuscular, intrarenal, intraperitoneal, intraocular, subcutaneous and the intra-articular space (*Id.*).

Chromium is a naturally occurring element found in rocks, animals, plants, soil, and volcanic dust and gases. It comes in several different forms, including trivalent chromium (chromium (III)) and hexavalent chromium (chromium (VI)). In contrast, chromium (VI) compounds cause cancer in humans and in experimental animals and exert genetic toxicity in bacteria and in mammalian cells *in vitro* (Fang, 2014; IARC, 2009). Adverse health effects, other than cancer, associated with chromium (VI) exposure include occupational asthma, eye irritation and damage, perforated eardrums, respiratory irritation, kidney damage, liver damage, pulmonary congestion and edema, upper abdominal pain, nose irritation and damage, respiratory cancer, skin irritation, and erosion and discoloration of the teeth. Some people with extensive dermal exposure can also develop an allergic skin reaction, called allergic contact dermatitis (Bruynzeel et al., 1988). Primary irritant dermatitis is related to the direct cytotoxic properties of chromium, while allergic contact dermatitis is an inflammatory response mediated by the immune system. During reduction to the trivalent form, chromium may interact with cellular macromolecules, including DNA (Wiegand et al., 1985), or may be slowly released from the cell. Complexes of chromium (III) that are bound to lower molecular weight ligands are most likely to be able to traverse cell membranes.

Chromium (III) has weak cell membrane permeability, allowing it to cross the cell membrane, where it can bind to DNA and cause lesions, resulting in genetic damage such as strand breaks and DNA-protein crosslinks (Nickens, 2010). This damage leads to genomic instability. Another study has shown that chromium (III) causes DNA damage in cells by interfering with base pair stacking in the cell's replication cycle, and chromium (VI) intercalates DNA – both directly cause genotoxicity *in vivo* (Fang, 2014).

Hexavalent chromium compounds are classified by IARC as carcinogenic to humans (Group 1)(IARC, 2009). Mechanistically, they have been shown to cause direct DNA damage after intracellular reduction to Cr(III), mutation, genomic instability, aneuploidy, and cell transformation (*Id.*). Chromium (VI) can cause damage leading to dysfunctional DNA replication, aberrant cell cycle, DNA strand breaks, dysfunctional DNA repair and DNA-protein crosslinks and directly causing genotoxicity (Nickens, 2010).

Besides direct genotoxic effects of chromium (VI), chromium compounds such as chromate can activate transcription factors involved in inflammation and tumor growth (IARC, 1990). Major factors

governing the toxicity of chromium compounds are oxidation state and solubility. These compounds, which are powerful oxidizing agents and thus tend to be irritating and corrosive, appear to be much more toxic systemically than chromium (III) compounds, given similar amounts and solubilities. Chromium (VI) enters many types of cells and, under physiological conditions, can be reduced by hydrogen peroxide (H₂O₂), glutathione (GSH) reductase and ascorbic acid to produce reactive intermediates, including chromium (V), chromium (IV), thiyl radicals, hydroxyl radicals, and ultimately, chromium (III). Any of these species could attack DNA, proteins and membrane lipids, thereby disrupting cellular integrity and functions (De Mattia, Bravi *et al.* 2004). Besides cancer, chromium is one of the most common skin sensitizers. It also causes toxicity of the kidney, liver, gastrointestinal tract, and cardiovascular, hematological and reproductive systems along with causing developmental effects.⁸ High doses of chromium (VI) compounds have been reported to cause developmental toxicity in mice and shown to potentiate the effects of other toxicants, including the nephrotoxins, mercuric chloride, citrinin, hexachlorobutadiene, and maleic acid.

Cobalt IARC declared that cobalt metal with tungsten carbide is *probably carcinogenic to humans (Group 2A)*, while cobalt metal without tungsten carbide is *possibly carcinogenic to humans (Group 2B)*. Two different mechanisms of genotoxicity, (1) DNA breakage induced by cobalt metal and especially hard metal particles, and (2) inhibition of DNA repair by cobalt (II) ions contribute to the carcinogenic potential of cobalt compounds (Lison *et al.*, 2001; IARC, 2006). Cobalt can also contribute to allergic reactions. In humans, gastrointestinal absorption of cobalt has been reported to vary between 5 and 45% and it has been suggested that absorption is higher in women than in men. Cobalt can be absorbed through intact human skin (IARC, 2006). Soluble cobalt salts interfere adversely with cell division, bind irreversibly to nucleic acids in the cell nucleus, induce chromosome aberrations in plants, and are weakly mutagenic in some *in vitro* tests. Injections or implantation of cobalt metal, alloys and compounds induced local and sometimes metastasizing sarcomas in rats, rabbits, and mice (*Id.*). Data indicating possible carcinogenic effects of cobalt alloys or compounds in human populations has arisen from medical use, use in hard-metal industries, and from cobalt production sites.

B. Metals in Talcum Powder Products

In an early paper by Cralley *et al.*, (1968), 22 cosmetic talcum products purchased off the shelf were analyzed for fibrous content, selected metals and quartz. In these studies, 19 samples contained cobalt under 25 parts per million (ppm) by weight, chromium under 22 ppm, nickel below 29 ppm and manganese under 78 ppm. Certain samples had a nickel content of 1270 ppm, chromium 340 ppm and 1210 ppm nickel; qualitative tests demonstrated that some of the chromium was hexavalent (carcinogenic form). All of these talcs had a considerable fiber content (suggesting the presence of asbestos) (*Id.*). Studies here suggest that women who used talcum powder in the 1960s could have been exposed to considerable amounts of toxic heavy metals depending on the type of talc used and frequency of use (*Id.*).

⁸ Accessible online at: <https://www.atsdr.cdc.gov/csem/csem.asp?csem=10&po=10>

In a 2013 study by Rehman, toxic and carcinogenic heavy metals were found to be present in small amounts in all 30 brands of cosmetic talcum powder tested; the concentrations of heavy metals differed dramatically depending upon the brand of talcum powder (Rehman, 2013). Heavy metals measured (and found in samples) included cadmium, chromium, copper, cobalt and lead. Authors found all levels to be within safe limits. However, authors caution that excess use of talcum powder affects the health of the consumer (*Id.*).

In a paper by Gondal et al. (2012), published in Applied Optics, lead and chromium were measured in talcum powder using laser-breakdown spectroscopy. Using this system, the authors were able to detect 15-20 parts per million (ppm) of lead and 20-30 ppm of total chromium in the talcum powder sample. This study, like that by Rehman, demonstrates the presence of toxic heavy metals associated with talcum powder. However, the levels of heavy metals in this study were significantly higher. The method used for measuring metals in this study was far more precise than that used by Rehman et al. (2013). This study supports the presence of toxic and potentially carcinogenic metals in some talcum powders.

According to Johnson & Johnson's corporate representative, the maximum amount of allowable nickel in the company's talcum powder products was 5 ppm (Deposition of John Hopkins, August 16, 2018, Ex. 3). Written specifications state that the maximum allowable nickel content is 10 ppm (JNJ 000629320; JNJ000488188; JNJMX68_000022920). Despite these limits, nickel in concentrations exceeding 2000 ppm were reported in Vermont talc used in talcum powder products for decades, greatly in excess of the product specification limit of 10 ppm (JNJ 000629320; JNJ 000488188; JNJMX68_000022920). Examples of testing results for heavy metals in Defendants' talcum powder products can be found in **Exhibit C**, attached to this report.

Over the years from 1972 to 2004, talc mined in Vermont had consistent, excessive levels of nickel, routinely exceeding 94 to 250 times the upper limit provided in J&J's specifications (Exhibit C). This is troubling considering nickel is a known carcinogen (IARC 2012).

Cobalt was found in Vermont talc ores in amounts ranging from 8 – 89 ppm from 1972 through 2004. Like nickel it, too, appears to occur routinely in talc products in amounts exceeding the 10 ppm upper limit for heavy metals in the talc product specifications (Exhibit C).

Internal documents outline Johnson & Johnson's concern regarding the potential carcinogenic nature of chromium (VI), a Group I carcinogen (JNJ 000131758; JNJ 000131754; JNJ 000378044; JNJ 000378046). A 2010 J&J memo written discusses raising the upper limit acceptable for total Cr to 7 ppm (JNJ 000131758). An accompanying memo also discusses the relationship between chromium (III) and chromium (VI) (JNJ 000131754), and a discussion of the inhalation of hexavalent chromium is contained in this document. Regardless of valence, Grade 66 analyses consistently show total chromium contents far in excess of 5-, 7-, or 10 ppm. During the period from 1972 thru 2004, the chromium content varied from 25 ppm to 569 ppm (Ex. 47, Pier Dep.), with typical levels around 200 ppm.

Interestingly, there is a significant difference between the reported chromium content of Grade 66 talc when the sample has been prepared by Johnson & Johnson (internal) method BPT 148 versus the

United States Pharmacopeia (USP) method which uses a total digestion technique (IMERYS-A_0015621). The levels reported using the USP method were much higher than the Johnson & Johnson method (*Id.*).

C. Fragrances

There are more than 150 different chemicals added to Johnson's Baby Powder and Shower to Shower products. I reviewed the expert report from Dr. Michael Crowley that concludes that some of these chemicals may contribute to the inflammatory response, toxicity, and potential carcinogenicity of Johnson & Johnson's talcum powder products.⁹ I concur with his opinion.

There is substantial evidence that talcum powder products contain excess levels of nickel, chromium, and cobalt, all known carcinogens and/or inflammatory agents. Moreover, a significant number of the fragrance chemicals added to talc elicit an inflammatory response. Each of these elements individually and together can contribute to an inflammatory response caused by the product. As will be explained in more detail below, inflammation is a known mediator of ovarian cancer. The presence of these inflammatory agents provides additional biologic evidence explaining the causal relationship between genital use of talc and ovarian cancer.

VI. EXPOSURE – TALC PARTICLE ACCESS TO THE BODY

A. Exposure Routes

Based on the tenets of toxicology, there are four basic routes of human exposure including: inhalation, ingestion, dermal and injection.

A common exposure route for cosmetic talc is via the dermal route, including vaginally after perineal application. Talc body powders are often applied to the perineum for hygienic purposes. It has been shown that glove powder and other materials can migrate upwards through the female reproductive tract (Venter & Iturralde, 1979; Iturre and Venter, 1981; Sjosten et al., 2004; Heller et al., 1995) and the data are supported by animal investigations (Wright et al., 1996; Edelstam et al., 1997; De Boer, 1972; Henderson et al., 1986), also reflective of a dermal exposure route.

Inhalation is the route of exposure that has been most commonly studied to assess talc toxicity. In one inhalation study, after talc exposure of hamsters, there was a consistent elevation in cytotoxic enzyme levels, and macrophage phagocytosis was persistently depressed (Beck et al., 1987). These results also indicated that, when a similar mass of talc and granite dust (12% quartz) was deposited in the lungs,

⁹ Expert Report of Michael Crowley, PhD (Nov. 12, 2018).

talc caused more lung injury than did granite (*Id.*). Based on its physical properties talc, in a powder form, can be inhaled while being applied (EPA, 1992; IARC, 2010). Additional evidence that application of talc body powder products results in inhalation exposure of talcum powder is provided in a 2017 study by Longo, et. al., and other studies (Longo, September 2017, “*Below the Waist Application of Johnson & Johnson Baby Powder*”; Wells, 1979; van Huisstede, 2010; Frank and Jorge, 2011; Jasuja, 2017).

1. Dermal - Migration Through the Upper Genital Tract

Animal models: Though animal studies have limitations due to the differences in anatomy, they provide evidence that talc can migrate through the reproductive system. Rats were exposed vaginally or via the perineum to either talc or no treatment for 3-mo on a daily basis (Keskin et al., 2009). In this study, there was evidence of foreign body reaction and genital infection, along with an increase in inflammatory cells in all the genital tissues. While no neoplastic changes were observed, the number of ovarian follicles in the talc groups were increased. No peritoneal changes were observed. The investigators concluded that talc by perineum exposure has adverse effects on the genital system in the form of foreign body reactions and infection (*Id.*).

In a series of two experiments, Henderson et al. (1986) demonstrated the presence of talc in the ovaries of two groups of animals following vaginal and intrauterine talc applications, whereas none was present in the ovaries of control animals. Particles were also seen in animals that had received intravaginal talc that were sacrificed after 4 days. (*Id.*)

Studies by Wright et al. (1995) also demonstrated the potential toxicity of retrograde uterine passage of particulate matter. Despite the aforementioned studies which demonstrate the plausibility of talc translocation, a study by Wehner et al. (1996) failed to demonstrate the same outcomes in a small sample of monkeys, which may have been due to the small sample size.

Human studies: A number of human studies over many years have observed migration of particles following vaginal administration: these studies began as early as 1961 when Egli and Newton studied the translocation of carbon particles following vagina application. In 1972, De Boer deposited colloidal carbon black (CB) suspension in the uterus, cervical canal or vagina in over 100 patients prior to surgery (De Boer, 1972). Subsequent observation revealed rapid translocation of CB to the oviducts and beyond. Some CB deposited in the cervical canal also translocated to the uterine passage, albeit in a lower percentage of patients (*Id.*). An early study by the National Institute of Occupational Safety and Health (NIOSH) in 1972 showed commercially available talc body powder samples contained fibers, and that exposure to fibers occurred during diapering (JNJ 000231304).

A study by Venter and Itteralde (1979) administered radiolabeled human albumin microspheres (no size provided) in the vagina of patients, followed by surgical removal of uterus, oviducts and ovaries. Results demonstrated that 9 out of 14 patients had radioactivity in their oviducts and ovaries. Recent studies have demonstrated the presence of talc particles in ovarian tumors (to be discussed in a later section). Another clinical study examined a total of 24 women undergoing oophorectomy (Heller et al.,

1995). In this case, women were questioned as to their use of perineal talc applications. Ovarian tissue was removed from each group and analyzed and quantitated for talc by polarized light and electron microscopy. These data support the ability of talc to migrate from the perineal region upward and reach the upper genital tract (*Id.*).

Further evidence for migration of particles to the upper genital areas comes from a document from the FDA to Dr. Epstein (Cancer Prevention Coalition, University of Illinois, Chicago) concerning Citizen Petitions dated 1994 and 2008 and requesting a cancer warning on cosmetic talc products. In this document, the FDA stated that “the potential for particulates to migrate from the perineum and vagina to the peritoneal cavity is indisputable” (JNJ 000488318).

In addition, a 2004 document from Luzenac America to Dr. Al Wehner (IMERYS 137677) recalls a 2004 published paper by Sjosten et al. (2004). Luzenac states that the paper “offers some compelling evidence **in support** of the ‘migration’ hypothesis.” The paper concluded that starch particles migrate from the vagina through the Fallopian tubes up to four days after examination with powdered gloves (*Id.*). The author of the Luzenac document goes on to state that combining this evidence with the theory that talc initiates epithelial inflammation and you have a “potential formula” for the NTP classification of talc as a carcinogen.

The most recent systematic review of the association between genital use of talcum powder products and ovarian cancer (Penninkilampi, 2018) reported an increased risk of ovarian cancer with increased perineal talcum powder use, with a slightly higher risk in women who report greater usage. Data was collected as “lifetime” usage – frequency of use over time. Any use was associated with increased risk of ovarian cancer as compared to no use, and women with long-term (> 10 years) talcum powder use had an increased risk. The authors concluded perineal talcum powder use and ovarian cancer were consistently associated, with a slightly higher risk in women who report greater usage.

Pathways that allow for the migration of particles to the lymph nodes are also available for that complex portion of the lymphatic system surrounding the ovaries. Importantly, studies by Chan et al. (2007) have demonstrated a positive association between lymphadenectomy and survival in stage 1 ovarian cancer patients. In support of this finding, Cramer et al. (2007) described the presence of talc particles in pelvic lymph nodes of a woman with ovarian cancer and long-term genital exposure to cosmetic talc.

Animal and human studies demonstrate that talcum powder products can migrate from the perineal region to the ovaries.

2. Inhalation

Effects of size on particle translocation and toxicity have been studied most extensively with inhaled particulate air pollutants and nanomaterials. These studies will be discussed to provide a scientific

premise for movement of particles of a certain size throughout the body. Small-sized particles can enter the bloodstream – translocation of particles and often toxicity are related to their size; perhaps because of the larger mass concentration of smaller vs. larger particles (Driscoll et al., 1997).

J&J's analysis of particle size in talcum powder products shows particles range on average from 0.8 μm to over 50 μm , with a median particle size of 11.39 μm , where approximately 43.9% of particles are less than 10 μm (JNJALC000878141).

Ultrafine particles (UFPs; $< 0.1 \mu\text{m}$) can directly affect the cardiovascular system by migration from the respiratory system to the systemic circulation (Nakane, 2012; Elder et al., 2006; Kreyling et al., 2006). Inhaled UFPs deposited in the lung can pass through the epithelial barrier because of their very small size; some particles may move into lung capillaries and then into the systemic circulation. Numerous studies and reviews have been written concerning the migration of these particles. In a systematic literature review (Nakane, 2012), particle size was shown to be a strong factor for migration. Particles that were translocated to various sites were observed to have the following sizes: $\leq 0.05 \mu\text{m}$ for remote organs, $\leq 1 \mu\text{m}$ for blood, and $\leq 10 \mu\text{m}$ for lung tissues. In order to be detected in the blood, particles that have passed through the epithelial barrier of the lungs must migrate into the capillaries. The largest chance for migration to the brain was observed at a 0.05- μm cutoff size. However, MnO_2 particles as large as 1.3 μm have also been detected in the cerebral cortex (Nakane, 2012). A categorical regression analysis based on currently available inhalation data showed that all of the effects of particle size, particle material, animal species, and exposure route were statistically significant (*Id.*). The effects were large for particle size and particle material, and small for exposure route and animal species. These results suggest that, in an experiment to evaluate the migration of solid particles, the characteristics of the particles (i.e., size and material) should be considered carefully.

Evidence from an internal document (1971) demonstrates rolled talc fibers between 0.1 - 3 μm in a Johnson and Johnson's commercial product (JNJAZ55_000005957). Other documents from Defendants have demonstrated that while median particle size is $\sim 10.5 \mu\text{m}$, sizes can be as small as 0.3 μm (IMERY5030347; IMERY5031791). V66 non-shear talc was approved for use in JNJ Shower to Shower products and the size of some of the particles had a diameter as small as 0.1 μm (JNJALC000878141). While the median particle size was $\sim 12 \mu\text{m}$, the standard deviation was very high ($\sim 9 \mu\text{m}$) demonstrating a large range of particle sizes. Fine-size particles such as those found in talc, can also translocate readily throughout the body (Peters et al., 2006), providing a strong basis for the ability of fine-size talc particles ($< 2.5 \mu\text{m}$ to migrate throughout the body).

Ultrafine and fine particles can penetrate through the different tissue compartments of the lungs and eventually reach the capillaries and circulating cells. These particles are then translocated by the circulation to other organs including the liver, the spleen, the kidneys, the heart and the brain, and the ovaries where they may be deposited. It remains to be shown by which mechanism(s) ultrafine particles penetrate through tissue and enter capillaries. Lymph capillaries remove the large protein molecules and other particulate matter from the tissue spaces of the lung. Thus, cellular debris and foreign particles inhaled into the lungs can be conveyed to the regional lymph nodes.

Talc particle size analyses for many inhalation studies demonstrated that most talc particles were between 1 and 8 μm ; 1 μm is considered ultrafine in size and thus particles could easily migrate from the lungs and throughout the body. Genofre et al., (2009) examined the effect of talc particle size on induced pleurodesis following intrapleural injection of rabbits with two different sizes of talc. One group contained mixed sizes of talc (mean size = 25.4 μm) and the other group small size talc only (mean size = 4.2 μm with 50% <6.4 μm) (*Id.*). Particles of both sizes migrated to the spleen, liver and kidney; more small talc particles (compared to mixed talc) was seen in the liver and kidneys. Both size particles produced an acute systemic inflammatory response, with small particle talc producing a more pronounced pleural and systemic response and resulting in greater particle deposition in the organs than the mixed talc (*Id.*). In addition, serum levels of the pro-inflammatory cytokine, IL-8 and VEGF were more markedly increased in the small talc group (*Id.*). Particles found in all systemic organs were <5 μm . A number of other studies have shown migration of talc particles from the pleural cavity to the systemic circulation (Ferrer, 2002; Rossi, 2010). It appears that small particles may be more easily taken up by the lymphatics than larger particles. The inflammatory effects observed showed a strong correlation with the small particle group. This study shows that size of talc particles matter and the smaller the size the greater the ability to translocate and increase the extent of the inflammatory response. As Defendants' internal documents demonstrate their talc particle size to cover a wide size range (100 μm to ~0.3 μm)¹⁰, there is extensive evidence that particles can be inhaled and transported through the blood and lymph to the ovaries.

In 1993, the National Toxicology Program (NTP) issued a report from a study concluding that there was "some evidence of carcinogenic activity" in male rats, "clear evidence of carcinogenic activity" in female rats, and no evidence of carcinogenic activity in male or female mice exposed to aerosols of talc reported as nonasbestiform cosmetic-grade (National Toxicology Program, 1993). Authors of that study speculated these effects could be due to cytokines released from macrophages or a nonspecific effect of the stress of inflammation (*Id.*).

In another study, rabbits were injected with normal size talc (Dmax = 8.36 μm) or larger particles talc (Dmax = 12 μm) (Ferrer et al., 2002). Pleural inflammation was greater with normal talc than large talc, and animals receiving normal talc had talc particles in the liver, supporting the premise that talc particles instilled into the pleural cavity can escape and migrate to extrapleural organs. Talc dissemination can be significant, and granulomas have been seen to develop in the interstitium after particles migrate from the lungs, with resultant pulmonary interstitial fibrosis (Hollinger, 1990). In another study illustrating talc dissemination (Werebe, 1999), talc was administered into the pleural space of rats. At both 24- and 48-hours, talc crystals were found in every organ of all animals, with the amount of talc being statistically different between the organs. Authors concluded there was a rapid absorption of talc through the pleural surface and a progressive systemic distribution of particles (*Id.*).

In addition to migration of ultrafine particles through tissue and movement to the lymph nodes, fine and coarse particles may be phagocytized by macrophages and dendritic cells which may carry the particles to lymph nodes in the lung or to those closely associated with the lungs (IARC, 2010). The uptake of fine particles (0.1–2.5 μm in diameter) by macrophages is a specific ligand-receptor mediated

¹⁰ IMERY346016; IMERY3030347; IMERY3031791; JNJAZ55_000005957.

actin-based process (phagocytosis), whereas the uptake of ultrafine particles ($<0.1\ \mu\text{m}$ in diameter) apparently occurs by other, non-specific mechanisms (Peters, 2006). These mechanisms are termed “adhesive interactions,” and include electrostatic, van der Waals and steric interactions (*Id.*). Particles with a diameter of $0.2\ \mu\text{m}$ and smaller appear to enter cells passively, that is by a mechanism which is different from phagocytosis. Larger particles are much more avidly taken up by macrophages, but by the specific receptor mediated, actin-dependent mechanism. Below the particle size of $0.2\ \mu\text{m}$, particles increasingly enter the macrophages by the non-specific “adhesive interaction” mechanisms mentioned above (*Id.*).

There is substantial evidence in the scientific and medical literature that support a conclusion that talc powder particles can reach the ovaries through inhalation.

VII. MECHANISM OF CANCER

A. Cancer - General

Tumorigenesis, the formation and growth of tumors, is a complex and multifactorial progressive process of transformation of normal cells into malignant ones (Pogribny and Rusyn, 2014). It is characterized by the accumulation of multiple cancer-specific heritable phenotypes, including persistent proliferative signaling, resistance to cell death, evasion of growth suppression, replicative immortality, inflammatory response, deregulation of energy metabolism, genomic instability, induction of angiogenesis, and activation of invasion ultimately resulting in metastases. It encompasses genetic, behavioral, and environmental factors that can all contribute to its development.

Mutations can occur as a result of the processes inside the cell, or alternatively, can be caused by external factors, such as chemicals. In addition, some people can inherit faults in particular genes that make them more likely to develop cancer. While normal cells obey signals indicating they have reached their growth limit, in cancer cells, the normal signaling system is disrupted. Mutations in particular genes may result in over- or under- production of proteins, or the production of abnormally formed proteins, all of which can lead to a lack of cellular regulation.

In general, cancer is an uncontrolled growth of abnormal cells in the body, which occurs when the body’s normal control mechanisms are disrupted. Excessive cellular division leads to a growth called a tumor. Mutations can happen by chance when a cell is dividing. Some mutations act by inhibiting normal controls over cell growth, leading to uncontrolled cell division. DNA may be damaged during routine cellular processes, and cells have mechanisms to repair that damage. However, over time, the damage may accumulate. Once cells exhibit increased cell growth, they are more likely to pick up additional mutations and are less likely to be able to repair the damaged genes.

If the DNA damage cannot be repaired, the cell can self-destruct, a process called apoptosis. In cancer cells, molecules in the repair pathway are faulty. For example, a protein called p53 normally determines whether genes can be repaired or if the cell should undergo apoptosis. Many cancers have a defective version of p53, and don't repair themselves properly. Thus, cancer cells can override self-destruct signals and don't undergo apoptosis when they should.

B. Genetic Mutations

Inherited mutations are passed down from parent to child and are present throughout a person's life in virtually every cell in the body. These mutations are also called germline mutations because they are present in the parent's egg or sperm (germ) cells. When an egg and a sperm cell unite, the resulting fertilized egg cell receives DNA from both parents. If this DNA has a mutation, the child that grows from the fertilized egg will have the mutation in each of his or her cells.

A genetic predisposition (sometimes also called genetic susceptibility) is an increased likelihood of developing a particular disease based on a person's genetic makeup. A genetic predisposition results from specific genetic variations that are often inherited from a parent. These genetic changes contribute to the development of a disease, but do not directly cause it. For example, mutations in the *BRCA* gene result in an increased risk for ovarian cancer. Some people with a predisposing genetic variation will never get the disease while others will, even within the same family. Genetic variations can have large or small effects on the likelihood of developing a particular disease. Although each of these variations only slightly increases a person's risk, having changes in several different genes may combine to increase disease risk significantly. Changes in many genes, each with a small effect, may underlie susceptibility to many common diseases, including cancer.

In people with a genetic predisposition, the risk of disease can depend on multiple factors in addition to an identified genetic change. These include other genetic factors (sometimes called modifiers) as well as lifestyle and environmental factors. Diseases that are caused by a combination of factors are described as multifactorial. Most disease-causing gene mutations are uncommon in the general population. However, other genetic changes occur more frequently. Genetic alterations that occur in more than 1 percent of the population are called polymorphisms.

Acquired (or somatic) mutations occur at some time during a person's life and are present only in certain cells, not in every cell in the body. These changes can be caused by environmental factors such as ultraviolet radiation from the sun, chemical exposure, or can occur if an error is made as DNA copies itself during cell division. Acquired mutations in somatic cells (other than sperm and egg cells) cannot be passed to the next generation.

Environmental and occupational exposures to natural substances, as well as man-made chemical and physical agents, play a causative role in human cancer. Acquisition of cancer-specific alterations may be triggered by the mutational and/or non-mutational (i.e., epigenetic) events in the genome which, in turn, affect gene expression and downstream phenotypes including persistent proliferative signaling, resistance to cell death, evasion of growth suppression, replicative immortality, inflammatory response,

deregulation of energy metabolism, genomic instability, induction of angiogenesis, and activation of invasion ultimately resulting in metastases.

Genotoxic carcinogens are agents that interact directly or after metabolic activation with DNA, causing mutations and leading to tumor formation. Non-genotoxic carcinogens are a diverse group of chemical compounds that are known to cause tumors by mechanisms other than direct damage to DNA. In a broad sense, carcinogenesis may be induced through either genotoxic or non-genotoxic mechanisms. However, both genotoxic and non-genotoxic carcinogens also cause prominent epigenetic changes (Pogribny and Rusyn, 2013). Disruption of epigenetic processes can lead to altered gene function and malignant cell transformation. Global changes in the epigenetic landscape are a hallmark of cancer.

The presence of talc particles in the ovaries (deep in the tumor) of some ovarian cancer patients and presence of talc in pelvic lymph nodes provides indirect evidence for talc carcinogenicity (Heller et al., 1996). Changes in signal transduction pathways that lead to increased and chronic inflammation are also associated with cancer, as are changes in cancer stem cells which have the ability to generate tumors through the processes of self-renewal and differentiation into multiple cell types. Cancer stem cells are thought to play a major role in tumor escape, chemoresistance/recurrence of ovarian cancer. Users of talcum powder have lower plasma levels of anti-MUC1 antibodies than non-users (Karageorgi et al., 2010). MUC1 is a protein highly expressed by ovarian, breast, and endometrial tumors, and low levels of anti-MUC1 antibodies are associated with poorer prognosis. Reducing immunity to MUC-1 could be one mechanism by which talc increases endometrial and/or ovarian cancer risk (Karageorgi et al. 2010).

C. Ovarian Cancer

There are two major categories of ovarian carcinogenesis based on the idea that tumors are heterogeneous: high-grade malignancies that tend to be fast growing and chemo-sensitive, and low-grade neoplasms which typically grow slowly, but are less sensitive to chemotherapy. The low-grade pathway is associated with a stepwise mutation process, whereas the high-grade develops through genetic instability (Lengyel, 2010). Ovarian cancer comprises at least five distinct histological subtypes, the most common and well-studied being high-grade serous ovarian cancer. The majority of these tumors arise from the distal end of the fallopian tube and evolve from premalignant lesions called tubal intraepithelial carcinoma (Saad, 2010). Several risk factors have been associated with increased risk of ovarian cancer and include: low parity, infertility, early age of menarche and late age of menopause.

Multiple mechanisms can explain the progression of ovarian cancer (Fleming et al., 2006; Fathalla, 2013; Saad, 2010; Smith and Xu, 2008). These mechanisms include: incessant ovulation- whereby repeated damage and trauma to the ovarian epithelium during ovulation increases the risk for genetic mutation and ovarian neoplasm during epithelium repair; pituitary gonadotropin changes- high levels of gonadotropins increase estrogen stimulation which can cause ovarian epithelial cells to become entrapped in inclusion cysts that undergo malignant changes; androgen/progesterone alterations- androgens stimulate ovarian cancer formation and progestins are protective; inflammation- factors that predispose to inflammation, such as endometriosis, PID, perineal talc use and hyperthyroidism could stimulate ovarian cancer. The molecular pathway in the inflammatory process involves intracellular

effectors implicated in malignant transformation such as VEGF, NF- κ B, nitric oxide synthase, and cyclooxygenase (Williams et al., 1999).

Genetic mutations also play a role in the development of ovarian cancer. For example, certain mutations in the *BRCA1* or *BRCA2* genes increase a person's risk of developing ovarian cancer. Both inherited and acquired gene mutations work together to cause cancer. Even if one has inherited a genetic mutation that predisposes one to cancer, that doesn't mean he or she is certain to get cancer. Rather, one or more additional gene mutations may be needed to cause cancer. The inherited gene mutation could instead make one more likely to develop cancer when exposed to certain cancer-causing substances.

D. Roles of the Immune System

It is well established that inflammation has paradoxical roles during tumor development (Coussens and Werb, 2002). While acute inflammation can be protective against tumors, chronic inflammation provides an environment for the tumor to thrive. The net outcome of tumor-associated inflammation depends on the dominance of either tumor-promoting or tumor-suppressive actions. Inflammation normally functions to maintain tissue homeostasis in response to tissue stressors such as infection or tissue damage. However, studies also suggest a close association between inflammation and tumorigenesis (Rakoff-Nahoum, 2006).

Two stages of inflammation exist, acute and chronic inflammation (Ingersoll, 2011). Acute inflammation is an initial stage of inflammation (innate immunity), which is mediated through the activation of the immune system. This type of inflammation persists only for a short time and is usually beneficial for the host. Acute inflammation (e.g., involving innate immunity, macrophages, natural killer cells, neutrophils) frequently precedes the development of protective adaptive immune responses to pathogens and cancer.

Chronic inflammation, by contrast, has been shown to contribute to tumorigenesis at all stages (Crusz and Balkwill, 2015). It contributes to cancer promotion by inducing cellular proliferation; and to cancer progression by enhancing angiogenesis and tissue invasion. Over time, chronic inflammation can cause DNA damage and lead to cancer. Inflammation initiated by genital application of talc is likely to be sustained, since studies indicate that women start using talcum powder at an early age and continue using it for decades.

E. Ovarian Cancer and Inflammation

Inflammation plays an important role in the progression of ovarian cancer, and it is a biologically plausible mechanism that mediates ovarian cancer. Recent clinical and prospective data suggest that C-reactive protein (CRP), a marker of global inflammation, is associated with increased ovarian cancer risk (Li, 2017; Poole, 2013; Jing, 2017). Other inflammatory markers may be important in ovarian carcinogenesis. In premenopausal women, ovarian epithelial cells secrete cytokines as part of ovarian function and some of these cytokines are also produced by ovarian cancer cells (Jammal, 2016). Epithelial

cells in proximity to ovulating follicles are likely exposed to these inflammatory mediators that may signal oxidative stress, and enhance the risk of mutagenesis. Importantly, cytokines involved in ovarian function, follicle rupture, and repair (physiologic processes before menopause) are suggested to remain activated in postmenopausal women and may play an etiologic role in ovarian carcinogenesis; these cytokines include: interleukin (IL)-1 α , IL-1 β , IL-2, IL-6, IL-8, IL-10, tumor necrosis factor alpha (TNF- α), interferon gamma (IFN- γ), granulocyte colony-stimulating factor (G-CSF), and granulocyte macrophage colony-stimulating factor (GM-CSF). Many inflammatory mediators, including prostaglandins, leukotrienes, and cytokines, are locally elevated during ovulation. Epithelial cells in proximity to ovulating follicles are likely exposed to these inflammatory mediators that may signal oxidative stress, and enhance the risk of mutagenesis. Moreover, IL-8, an important angiogenesis factor, is elevated in ovarian cancer patients and is believed to be a key factor for cancer growth and new vessel formation (Lane, 2011). Additionally, Saed et al. (2017) has reported that oxidative stress can play an important role in the pathogenesis, neoangiogenesis and dissemination of local or distant ovarian cancer.

Endometriosis is a pelvic disorder associated with inflammation and scarring. Studies also link endometriosis with the increased risk of epithelial ovarian carcinoma through pathways related to oxidative stress and inflammation (Melin, 2006; Worley, 2013). Studies indicate that women with endometriosis differ in the expression of inflammatory mediators, and changes in the cytokine network indicating immune dysregulation, which could contribute to the development of endometriosis (Pizzo, 2002). Wu et al. (2009) performed a study to determine the role of talc in the development of ovarian cancer, considering the history of endometriosis. Results demonstrated an increased risk of ovarian cancer with increasing frequency and duration of talc use; compared to never users, risk was highest among long duration, frequent talc users. A history of physician-diagnosed endometriosis was significantly associated with ovarian cancer in risks, and women who were talc users and had a history of endometriosis showed a 3-fold increased risk, and authors concluded risk of ovarian cancer is significantly associated with talc use and a history of endometriosis.

VIII. MECHANISM OF INFLAMMATION

Inflammation has long been associated with the development of cancer (reviewed by Heidland, 2006; Balkwill, Mantovani, 2001; Rakoff-Nahoum, 2006; Todoric, 2016). An inflammatory process begins when chemical mediators are released by the damaged tissue. The inflammatory response orchestrates host defenses and mediates tissue repair and regeneration in response to damage from chemical toxicants, foreign organisms or carcinogens. Epidemiological evidence points to a connection between inflammation and a predisposition for the development of cancer, i.e., long-term inflammation leads to the development of dysplasia (abnormal cell growth preceding cancer).

Inflammation is a well-established risk factor for all stages of carcinogenesis and tumor progression (Chow, 2012), including ovarian cancer (Maccio and Madeddu, 2012). Inflammation is a factor in a number of mechanisms regarding the etiology of epithelial ovarian cancer and a contributor to

ovarian tumor development and tumor progression (reviewed in Ness, 1999). Inhibition of inflammatory cytokines in the tumor milieu acts on inflammatory-induced angiogenesis and apoptosis and improves prognosis. In a review paper by Ness and Cottreau (1999), talc and asbestos are discussed as risk factors for ovarian cancer, along with endometriosis and pelvic inflammatory disease which are all associated with induction of local cancer.

A. Cytokine Networks

The cytokine networks are very active in producing pro-inflammatory cytokines, growth factors, and chemokines, all of which are molecules active in immune system signalling. There is evidence that inflammatory cytokines and chemokines, which are produced by tumor cells and/or tumor-associated leukocytes, may contribute directly to malignancy. Tumor necrosis factor (TNF)-alpha, a major mediator of inflammation, has actions directed towards both tissue destruction and recovery. TNF can be detected in malignant and/or stromal cells in human ovarian, breast, prostate, bladder and colorectal cancer, lymphomas and leukemias and often is associated with IL-1 and -6 and macrophage colony stimulating factor. TNF- α is also implicated in the induction of a chemokine called MCP-1 which can regulate the macrophage and lymphocyte infiltrate and of MMP-9 in the ovarian tumor microenvironment. There is also evidence for pro-cancer actions of TNF- α in animal models. The molecular basis is thought to involve induction of ROS in the form of NO synthase. NO can directly oxidize DNA, resulting in mutagenic changes, and may damage some DNA repair proteins. Inducible NO synthase has been detected in gynecological cancers, including ovarian cancer.

B. Macrophages

The neoplastic process which consists of proliferation, survival and migration is linked with the tumor microenvironment and synchronized with the influx of inflammatory cells, including neutrophils and macrophages which are a main source of exogenous reactive oxygen species (ROS) (Forman and Torres, 2002). Macrophages and the innate immune system can be responsible for tissue injury, when in excess or continuous.

This can also indicate macrophage activation leading to excess production of other macrophage-generated mediators, including cytokines. Macrophages can engulf talc particles and play a critical role in disease. Moreover, macrophages are the major constituents in granulomas. Talc can promote murine macrophage survival and DNA synthesis *in vitro* (Hamilton, 2001). Such enhancement of macrophage survival by talc, if it occurred *in vivo*, could lengthen the cells' tenure in a lesion with the result that more cells would be present to produce inflammatory mediators, such as cytokines, proteinases, and eicosanoids, perhaps potentiated by additional stimuli. This could be another mechanism as to how macrophage cell numbers increase in talc-induced granulomas and inflammatory reactions.

In a 2005 *in vitro* study (Bogatu and Contag, 2005), talc (as a fibrogenic dust) was shown to adsorb high density lipoprotein (HDL). The authors concluded that the adsorption of HDL could have a "causal relationship" with triggering of a fibrotic reaction. The adsorption on the surface of fibrogenic dust particles, including talc provides an opportunity for the intake of HDL by macrophages which then

release an increased amount of fibrogenic mediators. Coating of talc by HDL allows for more rapid uptake by the macrophage as it can use multiple receptors as points of entry into the cell. In general, surfaces of all fibrogenic particles, such as talc, have a specific property which is lacking in non-fibrogenic (inert) particles or is at least significantly less effective. However, even upon overloading, non-fibrogenic dusts cannot produce fibrosis.

In another study (Ghio et al., 2012), both mesothelial and airway epithelial cells exposed to talc significantly increased iron importation and concentration of the iron storage protein, ferritin. The production of pro-inflammatory cytokines was also induced by *in vitro* talc exposure relative to control lung tissue, and a time-dependent and concentration-dependent release of oxidants was observed in both cell types. Talc toxicity was also observed in an *in vitro* study comparing effects of micro-scale talc particles with those of smaller nanotalc particles on lung cells (Akhtar, 2010). Cell viability was decreased for all talc exposures, and decreased as a function of talc concentration, origin and particle size. Nanotalc particles differentially induced lipid peroxidation, reactive oxygen species and depletion of the anti-oxidant, glutathione. Further, data suggests that talc toxicity was mediated through oxidative stress.

A study by Khan et al. (2011) demonstrated that nanoscale talc, as opposed to larger talc particles enhanced its cytotoxicity. In this study, macrophages exposed to nanotalc increased the manufacture (transcription) of three macrophage-released pro-inflammatory cytokines and the phosphorylation of two signal transduction pathways. The authors indicated that the inflammatory potential of nano talc particles might be (at least partially) a potential mechanism in talc-mediated pathogenicity.

An early study (Davies et al., 1983) in which the cytotoxicity of seven talcs was evaluated using rat peritoneal macrophage demonstrated modest, but consistent macrophage cytotoxicity visualized by an increase in macrophage production of two enzymatic cell injury markers including lactate dehydrogenase (LDH) and B-glucuronidase (compared to *in vitro* treatment with a non-fibrogenic dust. This study points to the potential of talc to “activate” macrophage leading to increased production of macrophage-released mediators including pro-inflammatory cytokines. Some investigators have suggested such *in vitro* macrophage changes could predict fibrogenicity *in vivo*. Based on talc chemical analyses, the authors concluded that effects on macrophages were not due to contaminating minerals.

In a molecular cell study by Shukla et al. (2009), non-fibrous-containing talc at low concentrations caused increased expression of the gene Activating Transcription Factor (ATF genes modulates production of pro-inflammatory cytokines and growth factors in human lung cells) in cultured mesothelial cells at 8 hr and no changes at 24 hr, whereas expression levels of 30 genes were elevated at 8 hr at high talc concentrations.

Tumor necrosis factor (TNF)- α is a cell signaling protein produced by macrophages, primarily involved in the regulation of immune cells. Pre-diagnostic serum levels of 46-inflammation –related biomarkers were measured in 149 incident ovarian cancer cases and matched controls. As has been discussed in several aforementioned sections of this Report, C-reactive protein (CRP), IL-1- α and TNF- α proved to all be significantly elevated and associated with increased cancer risk. In analyses restricted to serous ovarian cancer (n=83), the associations with CRP and IL-8 remained or strengthened. Thus, IL-8

can also be considered an inflammatory biomarker of ovarian cancer (Trabert et al., 2014), again demonstrating talc's action as an inflammatory agent. Iron and its homeostasis are intimately tied to the inflammatory response (Wessling-Resnik, 2010). Talc has been shown to modulate TNF- α and IL-6 production by its binding to iron (Ghio, 2011). TNF- α , like CRP, is a marker of various inflammation processes. TNF- α has been shown to play a role in later steps of carcinogenesis. For example, NF- κ B activation by TNF- α is involved in neoplastic transformation, proliferation, and tumor survival. In addition, in ovarian cancer cells, TNF- α enhances cell migration and metastasis through the action of NF- κ B. TNF- α was positively associated with ovarian cancer in case-control studies using serum samples collected at diagnosis.

C. Role of Oxidants in Ovarian Cancer

The chronic inflammatory states associated with infection and irritation may lead to environments that foster genomic lesions and tumor initiation. One effector mechanism by which the host system responds to insult is production of free radicals such as reactive oxygen species (ROS), hydroxyl radical (OH \bullet) and superoxide (O₂- \bullet) and reactive nitrogen species (RNS), nitric oxide (NO \bullet) and peroxynitrite (ONOO). Primarily thought to be anti-microbial, these molecules form due to the activities of host enzymes such as myeloperoxidase, NADPH oxidase, and nitric oxide, which are regulated by inflammatory signaling pathways. Importantly, ROS and RNS lead to oxidative damage and nitration of DNA bases which increase the risk of DNA mutations.

During inflammation, macrophages, mast cells and neutrophils are recruited to the site of damage, which leads to a 'respiratory burst' due to an increased uptake of oxygen, and thus, an increased release and accumulation of ROS at the site of damage. A sustained inflammatory/oxidative environment leads to a vicious circle, which can damage healthy neighboring epithelial and stromal cells and over a long period of time may lead to carcinogenesis. Oxidative stress can also activate a variety of transcription factors. Activation of these transcription factors can lead to the expression of over 500 different genes, including those for growth factors, inflammatory cytokines, chemokines, cell cycle regulatory molecules, and anti-inflammatory molecules that can also be linked to cancer. Under a sustained environmental stress, ROS are produced over a long time, and thus significant damage may occur to cell structure and functions that could induce neoplastic transformation. In general, the longer the inflammation persists, the higher the risk of cancer.

Following an inflammatory stimulus, initiation of carcinogenesis mediated by ROS may be direct (oxidation, nitration, halogenation of nuclear DNA, RNA, and lipids), or mediated by the signaling pathways activated by ROS (Reuter, 2010; Saed, 2011; Saed, 2017). Hydrogen peroxide plays an important role in carcinogenesis because it is capable of diffusing through cell membranes and producing many types of cell injury. NO is another free radical implicated in carcinogenesis (Saed, 2017). iNOS, calcium-independent isoform, produces large amounts of NO and is only expressed during inflammation. ROS can specifically activate certain signaling pathways and thus contribute to tumor development through the regulation of cellular proliferation, angiogenesis, and metastasis.

1. Talc-Induced Inflammation and Oxidative Stress

Even a single dose of a carcinogen can produce effects that are adverse to cells and tissue at the site of exposure. *In vitro* studies provide a safe and effective vehicle by which to measure those effects in a controlled environment.

Carcinogenic potential of any compound can be determined by performing a well-established methodology called a neoplastic cell transformation assay. In a 2007 study by Buz'Zard, two human ovarian cell culture lines were treated in vitro with talc from 24 to 120 hr (Buz'Zard, 2007). Another group of talc-treated cells were also treated with a specific anti-inflammatory inhibitor to determine whether talc produced transformation through the production of inflammation. Following talc treatment of both ovarian cell types, the cells' ability to grow in suspension, a key characteristic of neoplastically transformed cells, was measured - non-neoplastically-transformed normal cells cannot grow in suspension. Results showed that treatment with talc can transform ovarian cells which further demonstrates the carcinogenic potential of talc. As anti-inflammatory treatment reduced formation of ROS and number of transformed colonies, a relationship between cell transformation and inflammation was demonstrated. Interestingly, exposure of ovarian cells to talc also increased ROS generation in this study in a time and dose-dependent manner. These effects could be linked with neoplastic changes as chronic inflammation is associated with cancer induction and ROS are often seen as a component of the tumor microenvironment. Human neutrophils exposed to talc in this study also increased ROS generation significantly compared to control phagocytes.

In a study carried out by Keskin in 2009, rats exposed to talc produced an increase in ovarian follicles which could be related to the "ovulation theory" associated with ovarian cancer, thus demonstrating a plausible mechanism for talcum powder-induced ovarian cancer.

Recent data demonstrates the importance of oxidative stress in ovarian cancer. The effects of talcum powder exposure on oxidative stress levels in normal ovarian epithelial cells, ovarian epithelial cells and cancerous ovarian epithelial cells were measured (Saed, 2017; Fletcher, 2018 (abstract)). Studies indicate that epithelial ovarian cancer manifests a persistent pro-oxidant state through alteration of the redox balance by the up-regulation of several oxidant enzymes in epithelial ovarian cancer tissues (Saed, 2018). Advancing similar work, in a recently accepted abstract, Harper and Saed report a mechanism by which talc enhances the pro-oxidant state in normal (ovarian and tubal) and ovarian cancer cells, through induction of gene point mutations (corresponding to known specific single nucleotide polymorphisms - SNPs) in key oxidant enzymes, altering their activities (Harper and Saed, 2018).

Emerging science by Fletcher (2018) demonstrated that talc-treated ovarian cancer cell lines and normal ovarian epithelial cells showed a marked increase in mRNA levels of pro-oxidant enzymes, including iNOS and MPO. This shift to a pro-oxidant environment indicates oxidative stress as early as 24 hours after exposure. These recent facts provide strong support for the ability of talc to produce an oxidant state that leads to inflammation and in turn epithelial ovarian cancer. This latter study shows that talcum powder enhances the redox state as part of the inflammatory cascade in both normal ovarian

epithelial cells and in ovarian cancer cells, revealing a plausible mechanistic underpinning for talc-induced ovarian cancer.

Another study by the same authors showed that talcum powder exposure increased levels of the cancer antigen, CA-125, in both normal ovarian cells and ovarian cancer cells. (Fletcher and Saed, 2018). CA-125 is an antigen that is elevated in some patients with specific types of cancers, and is used as a biomarker for ovarian cancer detection, providing further information about talcum powder's carcinogenic properties.

In a study by Shim et al. (2015), inhalation of talc revealed infiltration of macrophages and the increased expression of the antioxidant, superoxide dismutase indicating oxidative stress in rats. Moreover, in the same study inhalation of talc demonstrated macrophage aggregations and oxidative damage in the lungs. Intrapleural injection of talc particles produced an acute serum inflammatory response, more pronounced with smaller particles (Genofre et al., 2009). In addition, talc exposure induced vasoconstriction in the brain via the action of superoxide anions (Mori et al., 1995). Non-fibrous talc at low *in vitro* exposure concentrations caused increased expression of transcription factors associated with the inflammatory process in a time and dose-dependent manner (Shukla et al., 2009). Nano-talc exposure enhanced the production of pro-inflammatory cytokines by macrophages *in vitro* (Khan et al., 2011). Also, pre-treatment of macrophage (prior to talc exposure) with inflammatory signal transduction inhibitors reduced TNF mRNA stability demonstrating their role in TNF mRNA stabilization and expression (Khan et al., 2011).

In an epidemiological study, talc exposure was significantly associated with ovarian cancer in women who lacked a specific anti-oxidant genotype (glutathione-S transferase M1/T1) (Gates et al., 2008). Finally, talc exposure increases COX2, an enzyme that plays a critical role in inflammation (Pace et al., 2006).

At high concentrations or chronic exposure, ROS can damage cellular macromolecules and contribute to neoplastic transformation and/or tumor growth. Other likely manifestations of talc-induced inflammation include reduced fibrinolysis, activation of neutrophils and macrophages and increased production of cytokines and growth factors, and these have been suggested to occur in the peritoneum in response to contamination by surgical glove powder (Merritt et al., 2008).

In sum, inflammation is a primary mediator of ovarian cancer. As the scientific studies outlined above demonstrate, talcum powder products cause inflammation that can result in an elevation of biomarkers; changes in cell signaling; activation of chemokines and cytokines; changes in the oxidative environment; gene alterations and/or mutations; inhibition of apoptosis and induces neoplastic transformation and proliferation (i.e., cancer). This talcum powder-induced inflammatory cascade provides significant biologic and toxicologic support for a conclusion that talcum powder products can cause ovarian cancer.

D. Iron-Facilitated Inflammation

Talc particles can bind iron and iron facilitates inflammation and ROS production; surfaces of silicates including talc has a net negative charge on the surface which generates a capacity for the adsorption and exchange of cations like iron which has a high affinity for oxygen-donor ligands. According to J&J documents from Luzenac America Technical Center, heavy metal analyses on Grade 66 Non-Shear Disk Test Run samples demonstrated very high levels of iron (15,200 – 21,500 mg/kg) that could cause oxidative stress and an inflammatory response. Multiple studies have demonstrated that exposure to talc disrupts iron homeostasis, oxidative stress, and causes a fibro-inflammatory response (Akhtar et al., 2010; Ghio et al., 1992; Ghio et al., 2012). Talc exposure significantly increases iron importation and concentrations of ferritin (iron storage protein). The accumulation of iron, the accompanying oxidative stress, and inflammatory events after exposure to talc are comparable to those with other forms of particulate matter. The capacity of talc particles to support the *in vitro* generation of oxidants in an acellular environment was significantly affected by the concentration of associated iron, with talc-Fe producing a significantly greater signal for lipid peroxidation relative to talc alone (Akhtar, 2010). This relationship is supported by inhibition of the effect by addition of a metal chelator and a hydroxyl radical scavenger. The disruption of cell iron homeostasis is frequently associated with oxidative stress and inflammation.

IX. SUMMARY OF OPINIONS

I hold the following opinions to a reasonable degree of scientific certainty:

1. Based on the scientific literature and the testing results that I have seen by Defendants and Drs. Longo and Rigler, it is my opinion that talcum powder products, including Johnson's Baby Powder and Shower to Shower, may contain known carcinogens, including asbestos, fibrous talc, and heavy metals. In addition, these products contain fragrance chemicals, many of which are inflammatory agents, toxicants, or potential carcinogens.
2. Talcum powder can reach the ovaries through two routes with anticipated use: 1) perineal application (dermal) with migration/transport through the genital tract via the vagina, uterus, and fallopian tubes; and, 2) inhalation of talcum powder particles. Through either route, talcum powder and its constituents could reach the lymphatic system and bloodstream.
3. Exposure to talcum powder products causes an inflammatory tissue reaction which may result in the following:
 - a. Elevation of increased inflammatory markers;
 - b. Changes in cell signaling;
 - c. Activation and/or release of chemokines and cytokines;
 - d. Changes in the oxidative environment;
 - e. Gene alterations and/or mutations;
 - f. Inhibition of apoptosis; and

- g. Neoplastic transformation and proliferation
4. Based on knowledge of the carcinogenic components of talcum powder products, the potential of the powder, with its components, to reach the ovaries and the resultant inflammatory tissue response, it is biologically plausible for talcum powder products to cause ovarian cancer.

I reserve the right to amend or modify this report as new information becomes available. I have not testified in litigation over the previous 4 years. I am charging \$ 350 per hour for my work on this matter.

Exhibit A

JUDITH TERRY ZELIKOFF, Ph.D.
Tenured Professor

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Ramsey, NJ 07446
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W: (845)-731-3528
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EDUCATION

- 1973:** Bachelor of Science (**Biology**)
Upsala College
East Orange, NJ
- 1976:** Master of Science (**Microbiology**)
Farleigh Dickinson University
Department of Biology
Teaneck, NJ,
in conjunction with,
UMDNJ-New Jersey Medical School
Department of Neuroscience
Newark, NJ
Thesis Dissertation: Herpes Simplex Virus-IgM Specific Antibodies in
Guillian-Barre Syndrome
- 1982:** Doctor of Philosophy (**Experimental Pathology**)
UMDNJ-New Jersey Medical School
Department of Pathology
Newark, NJ
Thesis Dissertation: Cytoskeletal Modifications of Human Fibroblasts
that Occur During a Complement-Dependent Cytotoxic Antibody
Response

PROFESSIONAL EXPERIENCE

1982-Present: **NEW YORK UNIVERSITY SCHOOL OF MEDICINE**
Institute of Environmental Medicine
Tuxedo, NY

2005- Present: Tenured Professor
Laboratory of Pulmonary & Systemic Toxicology

Developmental Immunotoxicology: Effects of fetal insults on later life
immune-related diseases in the offspring.

Pulmonary Immunotoxicology: Characterization of inhaled metal, gaseous,
and airborne pollutant mixtures including woodsmoke and tobacco smoke,
on pulmonary immune defense mechanisms and host resistance against
infectious disease and asthma.

Environmental Toxicology/Ecoimmunotoxicology: Effects of aquatic pollutants on the immune responses of fish; development of immune biomarkers. Alternate animal models for immunotoxicological studies.

1995-2005: Associate Professor (Tenured in 1997)

Laboratory of Systemic Toxicology

1989-1995: Assistant Professor

1986-1989: Research Assistant Professor

Laboratory of Pulmonary Biology

Laboratory of Environmental Toxicology

Environmental Toxicology: Characterization of aquatic pollutants and immune defense mechanisms of fish. Studies concerning drug bioaccumulation and metabolism in different fish species.

Inhalation/Pulmonary Toxicology: Effects of ambient pollutants on macrophage metabolism and immune function.

1984-1986: Associate Research Scientist

Laboratory of Environmental Toxicology

Genetic Toxicology: Clastogenic/mutagenic effects of complex environmental mixtures.

Cell Biology: Establishment of primary cultures for assessing the toxicity of environmental contaminants *in vitro*.

1982-1984: NIH (NHLBI) Post-Doctoral Fellow

Laboratory of Environmental Toxicology

Genetic Toxicology: Development of short-term *in vitro* bioassays to detect carcinogens, promoters and co-carcinogens in complex environmental mixtures.

1977-1978: PFIZER PHARMACEUTICAL

Laboratory of Chemical Carcinogenesis

Maywood, NJ

Assistant Research Scientist

Laboratory studies using animal models and *in vitro* mammalian cell systems to investigate chemical- and viral-induced carcinogenesis.

1974-1975: VA HOSPITAL /UMDNJ-NEW JERSEY MEDICAL SCHOOL

Department of Neuroimmunology

East Orange, NJ

Associate Research Scientist

Laboratory studies investigating the etiology of viral-induced neuropathologies

TEACHING EXPERIENCE - NATIONAL

1990-Present: *NEW YORK UNIVERSITY SCHOOL OF MEDICINE*

Department of Environmental Medicine
Tuxedo, NY

Graduate Courses

- Global toxicology & community health (NYU Global College of Public Health: Organizer/Director, Fall, 2018; offered every year)
- Environmental Immunotoxicology (Organizer/Director, 1993-present)
- Organ System Toxicology (Director, 2001-present)
- Toxicology (Biology-cross linked: Director, 2010 – present)
- Communication Skills (Lecturer; 2010-present)
- Principles of Toxicology (Lecturer; 1992-present)
- Environmental Physiology of the Respiratory Tract (Lecturer; 1992– 1994)

1979-1994: *WILLIAM PATERSON COLLEGE*

Department of Biology
Wayne, NJ

Adjunct Professor

Undergraduate Courses

- Microbiology lecture and laboratory (1979 - 1984)
- Human biology lecture and laboratory (1979 - 1994)

1991-1994: *ROCKLAND COMMUNITY COLLEGE*

Department of Biology
Suffern, NY

Adjunct Professor

Undergraduate Courses

- Microbiology lecture and laboratory

1979-1982: *SETON HALL UNIVERSITY*

Department of Biology
South Orange, NJ

Research Scientist/Graduate Assistant

-Laboratory studies in immunopathology, virology, viral immunology, and microbiology

- Undergraduate and Graduate Courses

- Bacteriology lecture and laboratory
- Advanced Microbiology
- Cell biology/Virology techniques

1976-1979: *FAIRLEIGH DICKINSON UNIVERSITY*

Department of Biology
Teaneck, NJ

Adjunct Professor

Undergraduate and Graduate Courses

- General biology lecture and laboratory

- Human genetics
- Immunology

TEACHING EXPERIENCE - INTERNATIONAL

2013-present *UNIVERSITY OF PORT HARCOURT (Port Harcourt, Nigeria)*

Dept. of Toxicology

Lecturer in graduate toxicology course

2002-present: *CHULABHORN RESEARCH & GRADUATE INSTITUTE (Professor, Course Director)*

Department of Toxicology

Bangkok, Thailand

Graduate Course (3 weeks- given every even year)

- Environmental Immunotoxicology and Reprotoxicology

1999

1999-2000: *UNIVERSITY OF TASMANIA (Adjunct Professor)*

Department of Environmental Toxicology

Tasmania, Australia

Graduate Course (2 weeks)

- Fish Immunology & Immunotoxicology (Organizer/Director; Lecture and Lab)

1999-2000: *LINCOLN UNIVERSITY*

Department of Environmental Health Sciences

Christ Church, New Zealand

Graduate Course (2 weeks)

- Fish Immunology & Immunotoxicology (Organizer/Director; Lecture and Lab)

HONORS AND AWARDS

- 2018 – Society of Toxicology (SOT), Education Award
- 2015 – SOT, Women in Toxicology Mentorship Award
- 2013 – West African SOT (WASOT), Distinguished Recognition
- 2012 - 2014, SOT, Distinguished Service as SOT Secretary
- 2012 - SOT, Global Senior Scholar Host Award
- 2012 – SOT, Career Achievement Award in Immunotoxicology
- 2008 – Mid-Atlantic Chapter Society of Toxicology, President

PUBLICATIONS

Peer-reviewed Journals (In ascending order)

1. Ende, N., E.V. Orsi, F. Buechel, N.Z. Baturay and **J.T. Zelikoff**. Antibodies to synovial derived cells in patients undergoing artificial prosthesis transplants. *J. Orthopedic Res.* 3: 78-83 (1985).
2. **Zelikoff, J.T.**, J.M. Daisey, K. Traul and T.J. Kneip. Balb/c 3T3 cell transformation response to organic extracts of airborne particulate matter as seen by their survival in aggregate form. *Mutat. Res.* 144: 107-116 (1985).
3. **Zelikoff, J.T.**, N. Atkins, T.G. Rossman and J.M. Daisey. Cytotoxicity of fine particles with and without absorbed polycyclic aromatic hydrocarbons using Chinese hamster lung cells (V79). *Environ. Internat.* 11: 331-339 (1985).

4. **Zelikoff, J.T.**, N. Atkins and S. Belman. Stimulation of cell growth and proliferation in NIH-3T3 cells using onion and garlic oil. *Cell Biol. Toxicol.* 2: 369-378 (1986).
5. Ende, J., J. Grizzanti, E.V. Orsi, P.P. Lubanski, R.C. Amarusso, L.B. Reichman and **J.T. Zelikoff**. Sarcoid and cytotoxic lung antibodies. *Life Sciences* 39: 2435-2440 (1986).
6. Rossman, T.G., **J.T. Zelikoff**, S. Agarwal and T.J. Kneip. Genetic toxicology of metal compounds: An examination of appropriate cellular models. *Toxicol. Environ. Chem.* 14: 251-262 (1987).
7. Squibb, K.S., C.M.F. Michel, **J.T. Zelikoff** and J.M. O'Connor. Kinetics and metabolism in the channel catfish *Ictalurus punctatus*. *Veterinary Human Toxicol.* 34: 620 (1988).
8. **Zelikoff, J.T.**, J.H. Li, A. Hartwig and T.G. Rossman. Genetic toxicology of lead compounds. *Carcinogenesis* 9: 1727-1732 (1988).
9. Schlesinger, R.B., A.F. Gunnison and **J.T. Zelikoff**. Modulation of pulmonary eicosanoid biosynthesis following exposure to sulfuric acid. *Fundam. Appl. Toxicol.* 15: 151-162 (1990).
10. Schlesinger, R.B., K.E. Driscoll, A.F. Gunnison and **J.T. Zelikoff**. Pulmonary arachadonic acid metabolism following acute exposures to ozone and nitrogen dioxide. *J. Toxicol. Environ. Health* 31: 275-290 (1990).
11. Schlesinger, R.B., L.C. Chen and **J.T. Zelikoff**. Comparative potency of inhaled acidic sulfate aerosols: The influence of specific components and the role of H⁺ ions. *Environ. Res.* 52: 210-224 (1990).
12. Schlesinger, R.B., P.A. Weideman and **J.T. Zelikoff**. Effects of repeated exposure to ozone on respiratory tract prostanoids. *Inhal. Toxicol.* 3: 27-36 (1991).
13. **Zelikoff, J.T.**, N.A. Enane, D. Bowser, K.S. Squibb and K. Frenkel. Development of fish peritoneal macrophages as a model for higher vertebrates in immunotoxicological studies. I. Characterization of trout macrophage morphological, functional and biochemical properties. *Fundam. Appl. Toxicol.* 16: 576-589 (1991).
14. **Zelikoff, J.T.**, G.L. Kremer, M.C. Vogel and R.B. Schlesinger. Immunomodulating effects of ozone on macrophage functions important for tumor surveillance and host defense of the lung. *J. Toxicol. Environ. Health* 34: 449-467 (1991).
15. Costa, M., N.T. Christie, O. Cantoni, **J.T. Zelikoff**, X.W. Wang and T.G. Rossman. DNA damage by mercury compounds: An overview. Proc. of Advances for Mercury Toxicology. In *Advances in Mercury Toxicology* (T. Suzuki, Ed.), Plenum Press, NY. pp. 255-273 (1991).

16. Schlesinger, R.B., **J.T. Zelikoff**, L.C. Chen and P.L. Kinney. Assessment of toxicologic interactions resulting from acute inhalation exposure to sulfuric acid and ozone mixtures. *Toxicol. Appl. Pharmacol.* 115(2): 183-190 (1992).
17. **Zelikoff, J.T.** and R.B. Schlesinger. Immunomodulation by sulfuric acid aerosol: Effects on pulmonary macrophage-derived tumor necrosis factor and superoxide production. *Toxicology* 76: 271-281 (1992).
18. Cohen, M.D., E. Parsons, R.B. Schlesinger and **J.T. Zelikoff**. Immunotoxicity of *in vitro* vanadium exposure: Effects on interleukin-1, tumor necrosis factor, and prostaglandin E2 production by macrophages. *Int. J. Immunopharmacol. Immunotoxicol.* 15: 437-446 (1993).
19. **Zelikoff, J.T.** Metal pollution-induced immunomodulation in fish. *Ann. Rev. Fish Dis.* 2: 305-325 (1993).
20. **Zelikoff, J.T.**, E. Parsons and R.B. Schlesinger. Immunomodulating activity of inhaled particulate lead oxide disrupts pulmonary macrophage-mediated functions important for host defense and tumor surveillance in the lung. *Environ. Res.* 62: 207-222 (1993).
21. Enane, N.A., K. Frenkel, J.M. O'Connor, K.S. Squibb and **J.T. Zelikoff**. Fish macrophages as an alternative model for mammalian phagocytes. *Immunol.*, 80: 68-72 (1993).
22. **Zelikoff, J.T.**, R. Smialowicz, P.E. Bigazzi, R.A. Goyer, D.A. Lawrence, H.I. Maibach and D. Gardner. Immunomodulation by metals. *Fund. Appl. Toxicol.* 22: 1-8 (1994).
23. Bowser, D., K. Frenkel and **J.T. Zelikoff**. Effects of *in vitro* nickel exposure on macrophage-mediated immunity in rainbow trout. *Bull Environ. Cont. Toxicol.* 52: 367-373 (1994).
24. Schlesinger, R.B., H. El-Fawal, **J.T. Zelikoff**, J.E. Gorczynski, T. McGovern, C.E. Nadziejko, and L.C. Chen. Pulmonary effects of repeated episodic exposures to nitric acid vapor alone and in combination with ozone. *Inhal. Toxicol.* 6: 21-41 (1994).
25. Cohen, M.D., Z. Yang and **J.T. Zelikoff**. Immunotoxicity of particulate lead: *In vitro* exposure alters pulmonary macrophage tumor necrosis factor production and activity. *J. Toxicol. Environ. Health* 42: 377-392 (1994).
26. **Zelikoff, J.T.**, M. Sisco, Z. Yang, M.D. Cohen and R.B. Schlesinger. Immunotoxicity of sulfuric acid aerosol: Effects on pulmonary macrophage effector and functional activities critical for maintaining host resistance against infectious diseases. *Toxicology* 92: 269-286 (1994).
27. **Zelikoff, J.T.**, J.E. Bertin, R.K. Miller, S. Tabacova, E.S. Hunter, E.K. Silbergeld, T.M. Burbacher, and J. Rogers. Health risks associated with prenatal metal exposure. *Fund. Appl. Toxicol.* 25: 161-170 (1995).
28. **Zelikoff, J.T.**, K. Squibb, D. Bowser and K. Frenkel. Immunotoxicity of low level cadmium exposure in fish: Alternative animal models for immunotoxicological studies. *J. Toxicol. Environ Health* 45:235-248 (1995).

29. Cohen, M.D., T.P. McManus, Z. Yang, Q. Qu, R.B. Schlesinger, and **J.T. Zelikoff**. Vanadium alters macrophage interferon-gamma interactions and interferon-inducible responses. *Toxicol. Appl. Pharmacol.* 138: 110-120 (1996).
30. Cohen, M.D., **J.T. Zelikoff**, T.P. McManus, Q. Qu, and R.B. Schlesinger. Effects of ozone upon macrophage-interferon-gamma interactions. *Toxicology* , 114: 243-252 (1996).
31. Cohen, M.D., Z. Yang, **J.T. Zelikoff**, and R.B. Schlesinger. Pulmonary immunotoxicity of inhaled ammonium metavanadate in Fisher-344 rats. *Fund. Appl. Toxicol.* 33: 254-263 (1996).
32. Cohen, M.D., S. Becker, R. Devlin, R.B. Schlesinger, and **J.T. Zelikoff**. Effects of vanadium upon polyI:C-induced responses in rat lung and alveolar macrophage. *J. Toxicol. Environ. Health* 51: 591-608 (1997).
33. **Zelikoff, J.T.**, M. Sisco, M.D. Cohen, Y. Tsai, P.E. Morrow, M.W. Frampton, M.J. Utell, and R.B. Schlesinger. Effects of inhaled sulfuric acid aerosols on pulmonary immunocompetence: A comparative study in humans and animals. *Inhal. Toxicol.* 9: 731-752 (1997).
34. Rodgers, K., P. Klykken, J. Jacobs, C. Frondoza, V. Tomazic, and **J.T. Zelikoff**. Immunotoxicity of medical devices. *Fund. Appl. Toxicol.* 36:1-14 (1997).
35. Luebke, R.W., P.V. Hodson, M. Faisal, P.S. Ross, K.A. Grasman, and **J.T. Zelikoff**. Aquatic pollution-induced immunotoxicity in wildlife species. *Fund. Appl. Toxicol.* 37:1-15 (1997).
36. Anderson, M.J., M.G. Barron, S.A. Diamond, J. Lipton, and **J.T. Zelikoff**. Biomarker selection for restoration monitoring of fishery resources. ASTM STP 1317 (F. J. Dwyer, T.R. Doane, M.L. Hinman, Eds.), American Society for Testing and Materials. pp. 333 - 359 (1997).
37. Cohen, M.D., **J.T. Zelikoff**, L.C. Chen, and R.B. Schlesinger. Pulmonary retention and distribution of inhaled chromium: Effects of particle solubility and co-exposure to ozone. *Inhal. Toxicol.* 9:843-865 (1997).
38. **Zelikoff, J.T.** Biomarkers of immunotoxicity in fish and other non-mammalian sentinel species: Predictive value for mammals. *Toxicology* 129:63-71 (1998).
39. Cohen, M.D., **J.T. Zelikoff**, L.C. Chen, and R.B. Schlesinger. Immunological effects of inhaled chromium alone and in combination with ozone. *Toxicol. Appl. Pharmacol.* 152:30-40 (1998).
40. Beaman, J.R., R. Finch, H. Gardner, F. Hoffman, A. Rosencrance, and **J.T. Zelikoff**. Mammalian immunoassays for predicting the toxicity of malathion in a laboratory fish model. *J. Toxicol. Environ. Health* 56:523-542 (1999).
41. **Zelikoff, J.T.**, A. Raymond, E. Carlson, Y. Li, J.R. Beaman, and M. Anderson. Biomarkers of immunotoxicity in fish: From the lab to the ocean. *Toxicol. Lett.* 112-113:325-331 (2000).

42. Barron, M.G., M. Anderson, D. Beltman, T. Podrabsky, W. Walsh, D. Cacela, J. Lipton, S.T. Teh, D. Hinton, **J.T. Zelikoff**, A.L. Dikkeboom, B.A. Lasee, S.K. Woolley, D.E. Tillitt, M. Holey, P. Bouchard, and N. Denslow. Association between PCBs, liver lesions, and biomarker responses in adult walleye (*Stizostedium vitreum vitreum*) collected from Green Bay, Wisconsin. *J. Great Lakes Res.* 3:156-170 (2000).
43. Cohen, M.D., M. Sisco, Y. Li, and **J.T. Zelikoff**, and R.B. Schlesinger. Immunomodulatory effects of ozone upon *in situ* cell-mediated responses in the lungs. *Toxicol. Appl. Pharmacol.* 171:71-84 (2001).
44. Sweet, L.I., and **J.T. Zelikoff**. The toxicology and immunotoxicology of mercury: A comparative review in fish and humans. *J. Toxicol. Environ. Health-B* 4:161-205 (2001).
45. Palchaudhuri, S., A. Raymond, E. Carlson, Y. Li, and **J.T. Zelikoff**. Cytotoxic and cytoprotective effects of selenium on bluegill sunfish (*Lepomis macrochirus*) phagocytic cells *in vitro*. *Bull. Environ. Contam. Toxicol.* 67:672-679 (2001).
46. **Zelikoff, J.T.**, E. Carlson, Y. Li, A. Raymond, and J. Duffy. Immunotoxicity biomarkers in fish: Development, validation, and application for field studies and risk assessment. *Human and Ecotoxicol. Risk Assess.* 8:253:263 (2002).
47. Carlson, E., Y. Li, and **J.T. Zelikoff**. Exposure of Japanese medaka (*Oryzias latipes*) to benzo(a)pyrene suppresses immune function and host resistance against bacterial challenge. *Aquat. Toxicol.* 56:289-301 (2002).
48. Schlesinger, R.B., M.D. Cohen, T. Gordon, C. Nadziejko, J.T. **Zelikoff**, M. Sisco, J.F. Regal, and M. Ménache. Ozone differentially modulates airway responsiveness in atopic vs nonatopic guinea pigs. *Inhal. Toxicol.* 14:431-457 (2002).
49. **Zelikoff, J.T.**, M.D. Cohen, L.C. Chen, and R.B. Schlesinger. Toxicology of Woodsmoke. *J. Toxicol. Environ. Health - Part B.* 5 (3):269-282 (2002).
50. Cohen, M.D., M. Sisco, K. Baker, Y. Li, D. Lawrence, H. van Loveren, **J.T. Zelikoff**, and R.B. Schlesinger. Effect of inhaled ozone on pulmonary immune cells critical to antibacterial responses *in situ*. *Inhal. Toxicol.* 14:599-619 (2002).
51. Carlson, E., Y. Li, and **J.T. Zelikoff**. The Japanese medaka (*Oryzias latipes*) model: Applicability for investigating the immunosuppressive effects of the aquatic pollutant benzo(a)pyrene. *Mar. Environ. Res.* 54:5 - 9 (2002).
52. Duffy, J.E., E. Carlson, Y. Li, C. Prophete, and **J.T. Zelikoff**. Impact of polychlorinated biphenyls (PCBs) on the immune function of fish: Age as a variable in determining adverse outcome. *Mar. Environ. Res.* 54:1-5 (2002).
53. **Zelikoff, J.T.**, K.R. Schermerhorn, K. Fang, M.D. Cohen, and Schlesinger, R.B. A role for associated transition metals in the immunotoxicity of inhaled ambient particulate matter (PM). *Environ. Health Perspect.* 110:871-875 (2002).
54. **Zelikoff, J.T.**, L.C. Chen, M.D. Cohen, K. Fang, T. Gordon, Y. Li, C. Nadziejko, and R.B. Schlesinger. Effects of inhaled ambient particulate matter (PM) on pulmonary anti-microbial immune defense. *Inhal. Toxicol.* 15:101-120 (2003).

55. Duffy, J., E. Carlson, Y. Li, C. Prophete, and **J.T. Zelikoff**. Exposure to a coplanar PCB congener differentially alters the immune responsiveness of juvenile and aged fish. *Ecotoxicol.* 12:251-259 (2003).
56. Lippmann, M., Frampton, M., Schwartz, J., Dockery, D., Schlesinger, R., Koutrakis, P., Froines, J., Nel, A., Finkelstein, J., Godleski, J., Kaufman, J., Koenig, J., Larson, T., Luchtel, D., Liu L.J., Oberdorster, G., Peters, A., Sarnat, J., Sioutas C., Suh, H., Sullivan, J., Utell, M., Wichmann, E., and **Zelikoff, J.T.** The U.S. Environmental Protection Agency particulate matter health effects Research Centers Program: A midcourse report of status, progress, and plans. *Environ. Health Perspect.* 111:1073-1092 (2003).
57. Adams, S.M., M.S. Greeley, D.G. Fitzgerald, J.M. Law, E.J. Noga, and **J.T. Zelikoff**. Effects of flooding from three sequential hurricanes on the health and condition of fish in Pamlico Sound, NC. *Estuaries* 112:221-230 (2003).
58. Anderson, J.S., D. Cacela, D. Beltman, S.J. Teh, M.S. Okihiro, D.E. Hinton, N. Denslow, and **J.T. Zelikoff**. Biochemical indicators and toxicopathologic lesions assessed in smallmouth bass recovered from a polychlorinated biphenyl (PCB) contaminated river. *Biomarkers* 8:371-393 (2003).
59. Carlson, E., Y. Li, and **J.T. Zelikoff**. Suppressive effects of benzo[a]pyrene upon fish immune function: Evolutionarily conserved cellular mechanisms of immunotoxicity. *Mar. Environ. Res.* 151:131-138 (2004).
60. Carlson, E.A., Y. Li, **J.T. Zelikoff**. Benzo(a)pyrene-induced immunotoxicity in Japanese medaka (*Oryzias latipes*): Relationship between lymphoid CYP1A activity and humoral immune suppression. *Toxicol. Appl. Pharmacol.* 201:40-52 (2004).
61. Duffy, J.E., Y. Li, and **J.T. Zelikoff**. CYP1A induction in PCB 126-induced immunotoxicity in a feral fish model. *Bull. Environ Contam Toxicol.* 74:107-113 (2005).
62. Ng, S.P., A.E., Silverstone, Z-W. Lai, and **J.T. Zelikoff**. Effects of prenatal exposure to cigarette smoke on offspring tumor susceptibility and associated immune mechanisms. *Toxicol. Sci.* 89(1):135-144 (2006).
63. Duffy, J.E., and **J.T. Zelikoff**. Use of a fish model to examine the relationship between PCB-induced immunotoxicity and hepatic CYP1A induction. *J. Immunotoxicol* 3:39-47 (2006).
64. Prophete, C., E.A. Carlson, Y. Li, J. Duffy, B. Steinetz, S. Lasano, and **J.T. Zelikoff**. Effects of elevated temperature and nickel pollution on the immune status of Japanese medaka. *Fish & Shellfish Immunol.* 21:325-334 (2006).
65. Steinetz, B.G., T. Gordon, S. Lasano, T. L. Horton, S.P., Ng, **J.T. Zelikoff**, A. Nadas, and M.C Bosland. The parity-related protection against breast cancer is compromised by cigarette smoke during rat pregnancy: Observations on tumorigenesis and immunological defenses of the neonate. *Carcinogenesis* 27:1146-1152 (2006).

66. Cohen, M.D., C. Prophete, M. Sisco, L.C. Chen, **J.T. Zelikoff**, J. Smee, M. Holder, G. Crans. Pulmonary immunotoxic potential of metals are governed by select physiochemical properties: Chromium agents. *J. Immunotoxicol.* 3:69-81 (2006).
67. Ng, S.P., B.G. Steinetz, S.G., Lasano and **J.T. Zelikoff**. Hormonal changes accompanying cigarette smoke- induced pre-term births in a mouse model. *Exp. Biol. & Med.* 231:1403-1409. (2006).
68. Iba, M.M., J. Fung, Chung, L., J. Zhao, B. Winnik, B. Buckley, L.C. Chen, **J.T. Zelikoff**, Y. Kou. Differential inducibility of rat pulmonary CYP1A1 by cigarette smoke and wood smoke. *Mutat. Res.* 606:1-11 (2006).
69. Ng, S.P. and **J.T. Zelikoff**. Smoking during pregnancy: Subsequent effects on offspring immune competence and disease vulnerability in later life. *Repro. Toxicol.* 23(3): 428-437 (2007).
70. Naher, L.P., K.R. Smith, M. Brauer, C. Simpson, J.Q. Koenig, M. Lipsett, **J.T. Zelikoff**. Woodsmoke Health Effects: A Review. *Inhal. Toxicol.* 19:67-106 (2007).
71. Cohen, M.D., C. Prophete, M. Sisco, L.C. Chen, **J.T. Zelikoff**, J. Smee, M. Holder, G. Crans, A. J. Ghio, J.D. Stonehuerner. Pulmonary immunotoxic potential of metals are governed by select physiochemical properties: Vanadium agents. *J. Immunotoxicol.* 4:49-60 (2007).
72. Doherty, S.P., C. Prophete, P. Maciejczyk, K. Salnikow, T. Gould, T. Larson, J. Koenig, P. Jaques, C. Sioutas, **J.T. Zelikoff**, M. Lippmann and M.D. Cohen. Use of iron response protein binding activity analysis to detect changes in iron homeostasis inducible by PM2.5 components. *Inhal. Toxicol.* 19:553-562 (2007).
73. Duffy-Whritenour, J.E., and **J.T. Zelikoff**. Relationship between the immune and serotonergic systems in a teleost model. *Brain, Behavior and Immunity.* 22:257-264 (2008).
74. Ng, S, and **J.T. Zelikoff**. Effects of prenatal cigarette smoke exposure on offspring immune parameters later in life. *J. Toxicol. Environ. Health* 71:445-453 (2008).
75. Dietert, R.R. and J.T. Zelikoff. Early-life environment, developmental Immunotoxicology, and the risk of pediatric allergic disease including asthma. *Birth Defects Research Part B – Developmental and Reproductive Toxicology* 44:231-240 (2008).
76. Dietert, R.R. and **J.T. Zelikoff**. Pediatric immune dysfunction and health risks following early-life immune insult. . *Curr. Pediatr. Rev.* 5:36-51. (2009).
77. Vancza, E., S.P. Ng, and **J.T. Zelikoff**. The role of parity status in cigarette smoke-induced modulation of immune tumor surveillance mechanisms: A mouse model. *J. Immunotoxicol.* 6(2):94-104. (2009).

78. Ng, S.P., D. Conklin, A. Bhatnagar, Bolanowski, D.D., Lyon, J., and **J.T. Zelikoff**. Prenatal exposure to cigarette smoke induces diet- and sex-dependent dyslipidemia and weight gain in adult murine offspring. *Environ. Health Perspect.* 117(7):1042-1049. (2009).
79. Doherty-Lyons, S.P., J. Grabowski, C. Hoffman, and **J.T. Zelikoff**. Early life insult from cigarette smoke may be predictive of chronic diseases later in life. *Biomarkers* 114:102-106 (2009).
80. Tangjarukij, C., P. Navasumrit, D. Settachan, **J.T. Zelikoff**, M. Ruchirawat. The effects of pyridoxine deficiency and supplementation on hematological profiles, lymphocyte function, and hepatic cytochrome P450 in B6C3F1 mice. *J. of Immunotoxicol.* 6(3):147-160 (2009).
81. Cohen, M.D., Sisco, M., Prophete, C., Yoshida, K., Chen, L-C., **Zelikoff, J.T.**, Smee, J., Holder, A.A., Stonehuerner, J., Crans, D.C. and A.J. Ghio. Effects of metal compounds with distinct physicochemical properties on iron homeostasis and anti-bacterial activity in the lungs: Cr and V. *Inhal. Toxicol.* 22:169-178 (2010).
82. Dietert, R.R., and **J.T. Zelikoff**. Identifying patterns of immune-related disease: Use in disease prevention and management. *World Journal of Pediatrics* (Open Journal), 2010.
83. Dietert, R.R., DeWitt, J., Germolec, D.R., and **J.T. Zelikoff**. Breaking patterns of environmentally-influenced disease for health risk reduction: Immune perspectives. *Environ. Health Perspect.* Doi: 10.1289/ehp.1001971 (<http://dx.doi.org/>).
84. Duffy-Whritenour, J.E., R.Z. Kurtzman, S. Kennedy, and **J.T. Zelikoff**. Non-coplanar polychlorinated biphenyl (PCB)-induced immunotoxicity is coincident with alterations in the serotonergic system. *J. Immunotoxicol.* 120:45-51 (2011).
85. Allina, J., Grabowski, J., Doherty-Lyons, S., Fiel, M.I., Jackson, C.E., *Zelikoff, J.T., and *Joseph A. Odin (co-corresponding Authors). Maternal exposure to environmental stressors during pregnancy increased hepatic fibrosis and immune modulation in adult male offspring in a mouse model. *J. Immunotoxicol.* 8:258 (2011).
86. Blum, J., Hoffman, C., and **J.T. Zelikoff**. Inhaled cadmium oxide nanoparticles alters reproductive outcomes and fetal growth. *Toxicol. Sci.* 126 (2): 478-486 (2012).
87. Willis, D., Popovich, M.A., Gany, F., and **J.T. Zelikoff**. Toxicology of smokeless tobacco: implications for immune, reproductive, and cardiovascular systems. *J. Toxicol. Environ. Health B. Critical Reviews.* 15(5):317-331 (2012).
88. Rajamani, K., Doherty-Lyons, D., Bolden, C., Willis, D., Hoffman, C., **Zelikoff, J.T.**, Chen, L.C., and Gu, H., Prenatal and Early-Life Exposure to High-Level Diesel Exhaust Particles Leads to Increased Locomotor Activity and Repetitive

Behaviors in Mice. *Autism Res.* 6(4): 248-257 (2013).

89. Ng, S.P., Silverstone, A.E., Lai, Z.W., Harkema, J.R., and **J.T. Zelikoff**. Prenatal exposure to cigarette smoke suppresses anti-tumor cytotoxic T-lymphocyte (CTL) activity via changes in T-regulatory cells. *J. Toxicol. Environ. Health.* 76(19):1096-1100 (2013).
90. Amrock, S.M., Gordon, T., Zelikoff, J.T., and Weitzman, M. Hookah use among adolescents in the United States: Results of a national survey. *Nicotine Tobacco Res.* 16(2):231-237 (2014).
91. Vaughan J., Garrett B., Prophete C., Horton L., Sisco M., Soukup J.M., Zelikoff J., Ghio A., Peltier R., Chen L.C., and Cohen M.D. A Novel System to Generate WTC Dust Particles for Inhalation Exposures. *J. of Exp. Sci. and Environ. Epidemiol.* 24(1):105-112 (2014).
92. Blum J.L., Rosenblum L.K., Grunig G., Beasley M.B., Xiong J.Q., and **J.T. Zelikoff**. Short-term inhalation of cadmium oxide nanoparticles alters pulmonary dynamics associated with lung injury, inflammation, and repair in a mouse model *Inhal. Toxicol.* 26(1):48-58 (2014).
93. Willis D.N., Popovech M.A., Gany F., Hoffman C., Blum J.L. and **J.T. Zelikoff**. Toxicity of gutkha, a smokeless tobacco product, gone global: Is there more to the toxicity than nicotine? *Int. J. Environ. Res. Public Health.* 11(1):919-933. (2014).
94. Yochum C., Doherty-Lyon S., Hoffman C., Hossain, M.M., **Zelikoff J.T.** and J.R. Richardson. Prenatal cigarette smoke exposure causes hyperactivity and hyper-aggressive behaviors: relevance to maternal smoking and ADHD. (Zelikoff and Richardson are co-senior authors). *Exper. Neurol.* 254:145-152 (2014).
95. Orisakwe O.E., Blum J.L., Sujak S., and **Zelikoff, J.T.** Metal Pollution in Nigeria: A biomonitoring update. *J. Health & Pollution.* 4:40-52 (2014).
96. Zhou S, Rosenthal DG, Sherman S, **Zelikoff J.T.**, Gordon T, Weitzman M. Physical, behavioral, and cognitive effects of prenatal tobacco and postnatal secondhand smoke exposure. *Curr Probl Pediatr Adolesc Health Care.* 2014; 44(8):219-241.
97. Amrock SM, Gordon T, **Zelikoff JT**, Weitzman M. Hookah use among adolescents in the United States: results of a national survey. *Nicotine Tob Res.* 2014. 16(2):231-237.
98. Lauterstein D., Hoshino R, Watkins BX, Weitzman M, Zelikoff J.T. The changing face of tobacco use among US youth. *Curr Drug Abuse Rev.* 7(1):29-43 (2014) PMID 25323124.
99. Cohen, MD, Vaughan, JM; Garrett, B, Prophete, C, Horton, L, Sisco M, Kodavanti UP, Ward, WO, Peltier RE; **Zelikoff, JT**, Chen LC. Acute high-level exposure to WTC particles alters expression of genes associated with oxidative stress and immune function in the lung. *J Immunotoxicol.* 12(2):140-153 (2015).

100. Blum JL, Edwards JR, Prozialeck WC, Xiong JQ, **Zelikoff JT**. Inhalation of cadmium oxide nanoparticles during pregnancy produces nephrotoxicity in both mother and offspring. *J. Toxicol. Env. Health. Pt. A.* 2015;78(12):711-724.DOI: 10.1080/15287394.2015.1026622 (2015).
101. O'Neill BO, Dauterstein^a, D, Patel JC, **Zelikoff JT***, Rice ME. Striatal dopamine release regulation by the cholinergic properties of the smokeless tobacco, gutkha. *ACS chemical neuroscience.* 2015;6(6):832-837.DOI: 10.1021/cn500283b *Co-corresponding author. (2015).
102. Cohen, Mitchell D; Vaughan, Joshua M; Garrett, Brittany; Prophete, Colette; Horton, L.; Sisco, Maureen; Ghio, Andrew; **Zelikoff, Judith**; Lung-Chi, Chen. Impact of acute exposure to WTC dust on ciliated and goblet cells in lungs of rats. *Inhal. Toxicol.* 27(7):354-361.DOI: 10.3109/08958378.2015.1054531 (2015).
103. Yao Y., Chen T., Shen SS., Niu Y., DesMarais TL., Saunders E., Fan Z., Liou P., KluzT., Chen LC., Wu Z., Costa M., **Zelikoff J.** Malignant human cell transformation of Marcellus Shale gas drilling for flow back water. *Toxicol. Appl. Pharmacol.* 1;296:85. (2015)
104. Lauterstein, De., Tijerina PB., Corbett K., Oksuz A., Shen SS., Gordon T., Klein C., **Zelikoff JT**. Frontal cortex transcriptome analysis of mice exposed to electronic cigarettes during early life stages. *Int. J. Environ. Res. Public Health.* (2016) pii: E417. doi: 10.3390/ijerph13040417. PMID: 27077873.
105. Gany F., Bari S., Prasad L., Leng J., Lee T., Thurston G.D., Gordon T., Acharya S., Rexford B., **J.T. Zelikoff**. Perception and reality of particulate matter (PM) exposure on New York City taxi drivers. *J. Expos. Sci. Environ. Epidemiol.* (In press, 2016, *Epub ahead of print*; doi: 10.1038/jes.2016.23.).
106. Kumar S., Smith-Norowitz TA., Kohlhoff S., Apfalter P., Roblin P., Kutlin A., Harkema J., Ng SP., Doherty-Lyons S., **Zelikoff JT (co-corresponding author)**, Hammerschlag MR*. Exposure to cigarette smoke and *Chlamydia pneumoniae* infection in mice: Effect on infectious burden, systemic dissemination and cytokine responses: A pilot study. *J. Immunotoxicol.* 13(1):77-83 (2016).
107. Iain P., Sexton K., Prytherch Z., Blum J., **Zelikoff J.T***. (co-corresponding author), BeruBe K.A*, An *in vitro* versus in vivo toxicogenomics investigation of pre-natal exposures to tobacco smoke. *Appl. In Vitro Toxicol.* (In press, 2017).
108. Blum J.L., Chen L-C., **Zelikoff J.T*** (corresponding author). Exposure to ambient particulate matter during specific gestational periods produces adverse obstetric consequences in mice. *Environ. Health Perspect. Environ Health Perspect*; DOI:10.1289/EHP1029.
109. Gany F., Mukherjea A., Surani Z., Modayil M., Aghi M., Ulpe R., **Zelikoff J.**, Leng J., Parascandola M., Gupta P., South Asian alternative tobacco products: culture, epidemiology and policy. *J. Immigrant Minority Health.* (Jan. 2017).

110. Klocke C., Allen J.L., Sobolewski M., Mayer-Proschel M., Blum J.L., Lauterstein D., Zelikoff J.T., Cory-Slechta. Neuropathological consequences of gestational exposure to concentrated ambient fine and ultrafine particles in the mouse. *Toxicol. Sci. Apr 1:556(2):492-508.(2017)*
111. Zelikoff, Judith T., Parmalee N., Corbett K., Gordon T., Klein C B., Aschner m. Microglia Activation and Gene Expression Alteration of Neurotrophins in the Hippocampus Following Early Life Exposure to E-cigarette Aerosols in a Murine Model. *Toxicol Sci.* 2017 Nov 17. doi: 10.1093/toxsci/kfx257. [Epub ahead of print]
112. Church JS, Tijerina PB, Emerson FJ, Coburn MA, Blum, J.L., Zelikoff J.T., Schwartz J.J. *Perinatal exposure to concentrated ambient particulates results in autism-like behavioral deficits in adult mice.* *Neurotoxicology.* Nov 13. pii: S0161-813X(17)30211-5. doi: 10.1016/j.neuro.2017.10.007. [Epub ahead of print].
113. Duffy-Whritenour, J.E., S. Kennedy, and **J.T. Zelikoff**. Involvement of the neuroimmune axis in noncoplanar polychlorinated biphenyl-induced immunotoxicity. (In preparation). (*J. Immunotoxicol*).
114. Blum, J.L., Doherty-Lyon, D., Hoffman, C., Conklin, D., Young, D. and **J.T. Zelikoff**. High fat diet exacerbates the dyslipidemic effects of prenatal exposure to cadmium nanoparticles in the adult offspring. In preparation. (*Toxicol. Sci.*).

Commentaries/Letters to the Editor/Profiles:

1. **Zelikoff, J.T.**, S. Garte and S. Belman. Response to publication "Differential phosphorylation events associated with phorbol ester effects on acceleration versus inhibition of cell growth." *Cancer Res.* 47: 389-390 (1987).
2. **Zelikoff, J.T.** Commentary on "Ecotoxicity Testing." *Toxicology and Ecotoxicology News* 1: 123-124 (1995).
3. Penn, A. and **J.T. Zelikoff**. "Profile of the Department of Environmental Medicine, New York University Medical Center." *Toxicology and Ecotoxicology News* 3: 114:116 (1996).
4. Bayne, C. and **J.T. Zelikoff**,. Meeting review on "Modulators of Immune Responses-A Phylogenetic Approach." *Immunology Today* 20: 12-18 (1996).
5. **Zelikoff, J.T.** "Fish immunotoxicology: A new scientific discipline". *Toxicology and Ecotoxicology News.* 5: 130-132 (1996).

Book Chapters & Reports (1988 – Present, in ascending order):

1. Rossman, T.G., **J.T. Zelikoff**, S. Agarwal and T.J. Kneip. 1988. Genetic toxicology of metal compounds: An examination of appropriate cellular models. In: *Carcinogenic and Mutagenic Metal Compounds* 2. (E. Merian, et al., Eds), Gordon and Breach Science Publishers, NY. pp. 195-206.
2. **Zelikoff, J.T.** and Enane, N. 1991. Assays used to assess the activation state of rainbow trout peritoneal macrophages. In: *Techniques in Fish Immunology-2* (J.S. Stolen, et al., Eds.), SOS Publications, NJ. pp. 107-124.
3. **Zelikoff, J.T.** 1993. Immunological alterations as indicators of environmental metal exposure. In: *Modulators of Fish Immune Response: Models for Environmental Toxicology/Biomarkers, Immunostimulators*-Vol. 1 (J.S. Stolen, T. Fletcher, **J.T. Zelikoff**, S.L. Kaattari, D.P. Anderson, and L.E. Twerdok, Eds.), SOS Publications, NJ. pp. 101-110.

4. **Zelikoff, J.T.** and D. Bowser. 1994. Care and short-term laboratory maintenance of rainbow trout in laboratories with limited aquatic facilities. In: *Techniques in Fish Immunology-3* (J.S. Stolen, et al. Eds.), SOS Publications, NJ. pp. 13-14.
5. **Zelikoff, J.T.** 1994. Fish immunotoxicology. In: *Immunotoxicology and Immunopharmacology* (J. Dean, M. Luster, A. Munson, I. Kimber Eds), Raven Press, NY. pp. 386-403.
6. **Zelikoff, J. T.** and M. D. Cohen 1995. Immunotoxicity of inorganic metal compounds. In: *Immunotoxicology*. (R. Smialowicz, and M. Holsapple, Eds.), CRC Press, Boca Raton, FL. pp. 125-146.
7. **Zelikoff, J.T.**, W. Wang, N. Islam, L.E., Twerdok, M. Curry, J. Beaman, and E. Flescher. 1996. Assays of reactive oxygen intermediates and antioxidant enzymes in medaka (*Oryzias latipes*): Potential biomarkers for predicting the effects of environmental pollution. In: *Techniques in Aquatic Toxicology*. (G. Ostrander Ed.), CRC Press, FL. pp. 178-206.
8. **Zelikoff, J.T.** W. Wang, N. Islam, E. Flescher, and L.E. Twerdok. 1996. Heavy metal-induced changes in antioxidant enzymes and oxyradical production by fish phagocytes: Application as biomarkers for predicting the immunotoxic effects of metal-polluted aquatic environments. In: *Modulators of Immune Responses-A Phylogenetic Approach - Vol. 2* (J. Stolen, **J.T. Zelikoff**, L.E. Twerdok, D. Anderson, C. Bayne, C. Secombes, T. Fletcher, Eds.), SOS Publications, NJ. pp. 135-148.
9. Twerdok, L.E., J.R. Beaman, M.W. Curry, and **J.T. Zelikoff**. 1996. Health status determination and monitoring in an aquatic model (*Oryzias latipes*) used in immunotoxicological testing. In: *Modulators of Immune Responses - A Phylogenetic Approach-Vol. 2* (J. Stolen, **J.T. Zelikoff**, L.E. Twerdok, D. Anderson, C. Bayne, C. Secombes, T. Fletcher, Eds.), SOS Publications, NJ. pp. 210-215.
10. Benson, J. and **J.T. Zelikoff**. 1996. Respiratory toxicology of metals. In: *Toxicology of Metals*. (L.W. Chang, Ed.), CRC Press, FL. pp. 929-938.
11. **Zelikoff, J.T.** and R. 1996. Smialowicz. Metal-induced alterations in innate immunity. In: *Toxicology of Metals*. (L.W. Chang, Ed.), CRC Press, FL. pp. 811-826.
12. **Zelikoff, J.T.**, W. Wang, N. Islam and L.E. Twerdok. 1997. Immune responses of fish as biomarkers to predict the health effects of aquatic pollution: Application of laboratory assays for field studies. In: *Ecotoxicology: Responses, Biomarkers and Risk Assessment* (J.T. Zelikoff, J. Schepers, J. Lynch, Eds.), SOS Publications, Fair Haven, NJ. pp. 218-235.
13. **Zelikoff, J.T.** and M.D. Cohen. 1997. Metal Immunotoxicology. In: *Handbook of Human Toxicology*, (E.J. Massaro, Ed.), CRC Press, Boca Raton, FL. pp. 811-852.
14. Thomas, P.T. and **J.T. Zelikoff**. 1999. Air pollutants: Modulators of pulmonary host resistance against infection. In: *Air Pollutants and Effects on Health*. (S.L. Hogate, H.S. Koren, J.M. Samet, R.L. Maynard, Eds.), Academic Press, London. pp. 420-450.
15. **Zelikoff, J.T.**, C. Nadziejko, K. Fang, T. Gordon, C. Premdass, and M.D. Cohen. 1999. Short-term, low-dose inhalation of ambient particulate matter exacerbates ongoing pneumococcal infections in *Streptococcus pneumoniae*-infected rats. *Proceedings of Third Colloquium on Particulate Air Pollution and Human Health*. 8-94-8-104.
16. **Zelikoff, J.T.** Woodsmoke, kerosene emissions, and diesel exhaust emissions. In: *Pulmonary Immunotoxicology* (M.D. Cohen, **J.T. Zelikoff**, R.B. Schlesinger, Eds.), Kluwer Publ., MA. pp. 369-387 (2000).
17. Schlesinger, R.B., LC. Chen, and **J.T. Zelikoff**. 2000. Sulfur and nitrogen oxides. In: *Pulmonary Immunotoxicology* (M.D. Cohen, **J.T. Zelikoff**, R.B. Schlesinger, Eds.), Kluwer Publ., MA. pp. 337-353.
18. **Zelikoff, J.T.**, E. Carlson, E., Y. Li, A. Raymond, and J.R. Beaman. 2002. Immune system biomarkers in fish for predicting the effects of environmental pollution. In: *Proceedings of the Fourth Princess Chulabhorn International Science Congress*.

Chemicals in the 21st Century/Chemicals for Sustainable Development. (Chulabhorn Research Institute, Ed.), Trinity Publishing Co., Ltd., Bangkok, THAILAND, pp. 34-56.

19. Duffy, J., and J.T. Zelikoff. 2005. Approaches and models for the assessment of chemical-induced immunotoxicity in fish. In: *Investigative Immunotoxicology*. (H. Tryphonas, M. Fournier, B.R. Blakley, J.E. Smits, P. Brousseau, Eds.), Taylor and Francis, NY. pp. 49-63.

20. Zelikoff, J.T. 2005. Trace metals and the immune system. In: *Encyclopedic Reference of Immunotoxicology*. (H.W. Vorh). Springer-Verlag, Germany pp. 340-345.

21. Carlson, E. and J.T. Zelikoff. 2008. Fish immunology. In: *Toxicology of Fishes* (D. Hinton and R. Di Giulio, Eds.), CRC Press. pp. 340-352.

22. Ramanathan VM., Agrawal M., Akimoto H., Aufhammer S., (and 34 others), Zelikoff JT. UNEP: Atmospheric Brown Cloud: A Regional Assessment Report with Focus on Asia. Published in Bangkok by United Nations Environmental Program (2008).

23. Ng, SP., K. Yoshido, and J.T. Zelikoff. 2010. Host resistance tumor challenge assays. In: *Techniques in Immunotoxicology* (R. Dietert, Ed.) Informa Press.

24. Zelikoff, J.T. 2010. Other environmental health issues: Inhaled woodsmoke. In: *Encyclopedia of Environmental Health*. J. Nriagu (Ed.). Elsevier, UK. Pages 310-330.

25. Mudipalli, A. and Zelikoff, J.T. (Eds). Essential and non-essential metals: carcinogenesis, prevention and therapeutics. Springer, UK. 2018.

26. Ng, S.P., Zelikoff J.T. Tumor challenges in immunotoxicity testing. Vol. 599. Humana Press, Springer Science. Immunotoxicity Testing: Methods and Protocols, Methods in Molecular Biology. (2018)

27. Zelikoff, J.T., and M.D. Cohen. Pulmonary Immunology. In: *Comprehensive Toxicology*. (C. McQueen, Ed.). Elsevier, UK. 2018.

INVITED NATIONAL AND INTERNATIONAL LECTURES/PRESENTATIONS (Present – 2000, in descending order):

August 2018: International Society of Exposure Science (ISES); International Society for Environmental Exposure (ISEE). *Contamination of the Ramapough Nation: A toxic legacy. Environmental contamination and Indigenous populations symposia.* Ontario, Canada.

February 2018: Louisiana State University. Electronic cigarettes and pregnancy: Lessons learned from mice. Baton Rouge, LA

January 2018: Mt. Holyoke College. What's safer for the unborn child: electronic cigarettes or air pollution? MA.

December 2017: Texas A & M. Prenatal exposure to ambient particulate matter impacts cardiovascular development. TX.

December 2017: International Conference on Environmental Impacts. Air pollution and pregnancy. Deradun, India

November 2017: International Conference on "Impact of Environment on Women's Health: Amity University Uttar Pradesh. Maternal exposure to particulate air pollution during pregnancy and Impacts on fetal health: What are we learning from animal studies? Lucknow, India.

November 2017: American Public Health Assoc. (APHA) Annual Meeting. Identifying Environmental concerns, environmental exposures and health concerns in the Ramapough Lenape Tribe. Atlanta, GA.

October 2017: International Society of Exposure Science. A community in toxic crisis: Ramapough Native Americans. Durham, NC.

April 2017: Queensborough College. Neurocognitive effects of E-cigarettes. Queens, NY.

July 2016: NIOSH seminar. Reproductive implications of Nanomaterials. WV

July 2016: EPA seminar. Ambient particulate matter and cardiotoxicity. Chapel Hill, NC.

June 2016: Workshop on Nanomaterials and the fetal-placental unit. Prenatal Nephrotoxicity and Maternal Nanomaterial Inhalation. Boston, MA.

May 2016: NIH Tobacco Research. Toxicological assessment of smokeless tobacco products: A systematic ranking system. Bethesda, MD

April 2016: AHA, ATrac Meeting. Toxicity ranking of alternative tobacco products. Louisville, KY.

March 2016: Society of Toxicology: Course in Medical Education. Effects of fracking on reproductive and developmental health. New Orleans, LA

March 2016: Society of Toxicology: Symposia on Fracking and Health. Effects of fracking on reproductive and developmental health. New Orleans, LA

February 2016: American Association for Advancement of Science: Symposia on Alternative Tobacco Products and Health. Early life exposure to alternative tobacco products as a major risk factor of later life chronic disease. Washington, DC

October 2015: 7th International Symposia on Nanotechnology and Occupational and Environmental Health. Reproductive and developmental toxicity of gold nanoparticles in a mouse model of pulmonary exposure. Limpopo Province, South Africa.

May 2015: Amer. Assoc. Immunol. Maternal inhalation of ambient particulate matter causes alterations in immune profiles and anti-tumor mechanisms in juvenile murine offspring. New Orleans, LA.

April 2015: Wayne State University, CURES Seminar Series at Wayne State University's Institute of Environmental Health Sciences. Maternal exposure to particulate air pollution during pregnancy impacts fetal development and neonatal growth in a mouse model.

March 2015: Society of Toxicology. Symposia on: New and Emerging Tobacco Products—Biomarkers of Exposure and Injury (Chair). Reproductive/Developmental effects of exposure to new and emerging tobacco products and to nicotine delivery devices in a mouse model. San Diego, CA.

Dec. 2014: University of Illinois – Maternal exposure to ambient particulate matter during particular gestational windows produce developmental and reproductive consequences in a mouse model. Urbane, IL.

July 2014: Oregon State University – Early life nanoparticle exposure brings early and later life health consequences. Corvallis, OR.

March 2014: Society of Toxicology – Tobacco products and prenatal exposures. Phoenix, Arizona.

February 2014: West African Society of Toxicology – Air pollution in developing nations. Lagos, Nigeria.

January 2014: Ernst Strungmann (ES) Forum, (Rapporteur)- Heavy metals and infectious disease. Frankfurt Germany.

November 2013: American Chemical Council. Risk Assessment and Communication, Working Group. Washington, DC.

October 2013: First International Conference on Waterpipe Tobacco Research. Working Discussion Group Leader: Abu Dhabi.

October 2013: NIH-sponsored Workshop in South Asian Diversity Populations and Health Effects. Sloan Kettering Cancer Center. Working Group member on smokeless tobacco. NY, NY.

- June 2013: FDA, Center for Tobacco Control.** Public health impacts of fetal exposures to tobacco & environmental toxicants: From early life to adult disease and policy needs. MD
- March 2013: Society of Toxicology, Committee on Diversity Initiatives** – Exposure to smoked and smokeless tobacco *in utero*: Fetal injury and life long consequences. San Antonio, TX
- February 2013: Nigeria University** – Smokeless tobacco: A global look at the problem, Port Harcourt, NIGERIA
- February 2013: FDA: Center for Medical Devices** – Fetal basis of adult disease: early life exposure to environmental and occupational toxicants. Silver Spring, MD.
- October 2012: Memorial Sloan Kettering** – Arsenic contamination in Bangladesh. New York, NY
- May 2012: Memorial Sloan Kettering** – Toxicology of Smokeless tobacco. NY, NY.
- April 2012: University of Connecticut** – Tobacco products *in utero* are associated with later life disease outcomes. Storrs, CT.
- March 2012: Biomass Symposium** – Toxicological implications for domestic burning. Feb. 2012: NYU Medical Center, Dept. of Psychiatry - Chemical stressors *in utero* and later life disease outcomes. New York, NY.
- Jan 2012: British American Tobacco** – *In vitro* translational studies and the toxicology of smoking. Southampton, UK.
- Dec. 2011: FDA** – **The reproductive effects of cadmium nanoparticles.** Reston, VA.
- Dec. 2011: NYU Dept. of Bioethics** – Cigarette smoking & smokeless tobacco: Is there really a good choice? New York
- Oct. 2011: NorCal SOT** – **Fetal basis of adult disease – the role of maternal smoking.** Menlo Park, CA.
- Sept. 2011: European Aerosol Conference – Plenary Lecture:** The toxicology of biomass combustion emissions. Satellite Workshop on Biomass Combustion, Manchester, England.
- March 2011: NYU Ethics Forum** - Exposure to Cigarette Smoke *in Utero*: Fetal injury and Life Long Consequences. New York
- March 2011: NYU Medical Center, Dept. of Obstetrics and Gynecology Grand Rounds** – Early life insult by tobacco smoke and later life disease susceptibilities. March 15, 2011
- March 2011: Society of Toxicology, Committee for Diversity Interests** – Cigarette exposure *in utero*: You are what you breathe. Washington, DC. March, 2011.
- Nov. 2010: Texas A & M University** – Early life exposure to cigarette smoke suppresses anti-tumor immune defenses of the prenatally exposed offspring in a mouse model” College Station, TX.
- May 2010: Workshop on Emissions and Health Impacts of Biomass Fuels** – Health effects of woodsmoke: A toxicological model for mechanisms and policy needs. Penn State, State College, PA.
- March 2010: Environmental and Occupational Health Sciences Institute, Rutgers University** - Fetal exposure to cigarette smoke mediates anti-tumor immune mechanisms in adult murine offspring. New Brunswick, NJ. March, 2010.
- March 2010: Society of Toxicology, Committee for Diversity Interests** – Exposure to cigarette smoke in utero: Fetal injury and life-long consequences. Salt Lake City, UT.
- Nov. 2009: United Nations Environmental Programme** – Toxicological assessment of the atmospheric brown cloud. Incheon, Korea.
- Sept. 2009: 7th Congress of Toxicology in Developing Countries** – Fetal insult and later onset diseases. Sun City, South Africa.

- August 2009: *Japanese Society of Immunotoxicology*** – Prenatal exposure to cigarette smoke increases tumor susceptibility of juvenile mice via changes in anti-tumor immune mechanisms. Asahikawa, Japan.
- May 2009: *Asia-Pacific Forum on Andrology***, Hormonal changes accompanying cigarette smoke induced preterm births in a mouse model. Nanjing China.
- Dec. 2008: *St. Johns University*** – Mechanistic insights into offspring cancer risk associated with maternal smoking. Queens, NY.
- August 2008: *U.S. EPA, National Center for Environmental Assessment*** - Gender-related effects on offspring tumor risk and response to prenatal cigarette smoke exposure may be related to testosterone: a toxicological model. Washington, DC.
- June 2008: *Institute for Science and Health (IFSH)*** – Early exposure to cigarette smoke may serve as an indicator of chronic diseases in the offspring later in life. Cardiff, Wales.
- March 2008: *Society of Toxicology*** –Prenatal exposure to tobacco smoke induces asthma-related responses in non-sensitized female offspring later in life. Seattle, Washington.
- March 2008: *Society of Toxicology*** – Prenatal exposure to cigarette smoke: Are our children paying the price? Seattle, Washington. March 2008.
- August 2007: *United Nations Environmental Program (UNEP)*** – Toxicology of the Atmospheric Brown Cloud (ABC). Seoul, Korea.
- March 2007: *University of Louisville (KY)*** – Increased cancer risk: A possible birth defect associated with maternal smoking. Louisville, KY.
- March 2007: *Institute for Science and Health (IFSH)*** – Prenatal cigarette smoke exposure and offspring asthma. Louisville, KY.
- Feb. 2007: *International Conference on Environment: Survival and Sustainability*** - Sustaining a healthy fetal environment: A little told threat of increased cancer and asthma risk for the juvenile offspring exposed prenatally to cigarette Smoke. Near East University, Nicosia-Northern Cyprus.
- Feb. 2007: *International Conference on Environment: Survival and Sustainability*** - Contamination of aquatic environments with polychlorinated biphenyls (PCBs) or benzo(a)pyrene (B[a]P) can adversely impact the immune health and sustainability of inhabiting Fish. Near East University, Nicosia-Northern Cyprus.
- Dec. 2006: *Philip Morris External Review Symposia*** – Effects of prenatal exposure to cigarette smoke on tumor development and immune surveillance mechanisms in the developing offspring: A toxicological model. Landsdowne, VA. Dec. 2006.
- May 2006: *MidAtlantic Chapter of Society of Toxicology (MASOT)*** – Increased cancer risk in the offspring: A birth defect associated with maternal smoking. Scotch Plains, NJ.
- April 2006: *University of Guelph*** – Maternal smoking and cancer: Are the unborn children paying the price? Kempville, Ontario Canada.
- March 2006: *Institute for Science and Health*** – Prenatal exposure to mainstream cigarette smoke alters susceptibility of the offspring to asthma. Vienna, Austria.
- March 2006: *Society of Toxicology*** – Maternal smoking and cancer: Are the unborn children paying the price? San Diego, CA.
- October 2005: *Chulabhorn Research Institute*** – *Immunotoxicology: A new focus for Thai science*. Scientific Research Institute of Thailand. Bangkok, Thailand.
- May 2005: *American Thoracic Society*** - Immunotoxicological mechanisms of prenatally-exposed respiratory contaminants. Symposia on “Impact of prenatal and early infancy environmental exposures on neonatal and infant health”. San Diego, CA..

- May 2005: *California Society of Environmental Toxicology and Chemistry*** – Mechanisms of Fish Immunotoxicity. Berkley, CA.
- April 2005: *Life Science Research Organization (LSRO)*** – Prenatal exposure to cigarette smoke increases tumor susceptibility in the offspring: A toxicological model. St. Louis, MO.
- March 2005 - *Society of Toxicology*** – Immunotoxicity of prenatal mainstream cigarette smoke exposure. Symposia on “Mechanisms Linking the Lung and Immune System”. New Orleans, LA.
- Feb. 2005: *Institute for Science and Health (IFSH)*** – Effects of in utero cigarette smoke exposure on asthma development in the offspring. Washington, DC.
- Feb. 2005: *Canadian Lung Association*** – Health Effects of Woodburning. New Brunswick, Canada.
- Nov. 2004: *Environmental Mercury Research Forum***. Metal toxicity in aquatic organisms. Energy & Environmental Research Center (U. of North Dakota). Grand Forks, ND.
- Oct. 2004: *VIIIth Annual Conference of Soil, Sediments and Water***. Immunological Alterations as Bioindicators of Environmental Health. Amherst, MA.
- Sept. 2004: *Slovenian Society of Toxicology*** – Immunological biomarkers. Lubljana, Slovenia.
- March 2004: *Society of Toxicology*** – Inhalation of concentrated ambient particulate matter and associated metals increases host susceptibility to pulmonary pneumonia. Baltimore, MD.
- Jan. 2004: *University of Arizona*** – Toxicological impact of inhaled wood smoke on pulmonary antimicrobial defense. Tucson, AZ.
- Jan. 2004: *College of Staten Island*** – Toxic insult and human health effects: Lessons learned from an aquatic species. Staten Island, NY.
- Dec. 2003: *Sixth National Environmental Public Health Conference (Center for Disease Control)*** Woodsmoke: A closer look at public health concerns and mechanisms of toxicity. Atlanta, GA.
- Nov. 2003: *Society of Environmental Toxicology and Chemistry*** - Immunotoxicology and Risk Assessment. Austin, TX.
- Oct. 2003: *Chulabhorn Research Institute*** – Immunotoxicology Course Series (10d). Bangkok, Thailand.
- June 2003: *International Symposium on Pharmaceutical Sciences*** - Health Effects of Inhaled Particulates. University of Pharmaceutical Sciences. Ankara, Turkey.
- June 2003: *United States Army Center for Environmental Health Research*** - Immune Assays for Hazard Assessment and Species Extrapolation. Fort Detrick, MD.
- May 2003 - *Pollutant Responses of Marine Organisms (PRIMO)*** - Immunotoxicology in Fish. Tampa, FL.
- March 2003: *Society of Toxicology*** - Woodsmoke: Cozy Atmosphere or Public Menace? Salt Lake City, UT.
- Nov. 2002: *Society of Toxicology and Chemistry*** - Immune Biomarkers for Use in Ecological Risk Assessment. Salt Lake City, UT.
- Oct. 2002: *Padova University*** - Lessons Learned About Human Health From Aquatic Species. Padova, Italy.
- Oct. 2002 - *Slovenia Society of Toxicology*** - Biomarkers for Ecotoxicology. Ljubljana, Slovenia.
- Sept. 2002: *University of Florida*** - Effects and Mechanisms of Benzo(a)pyrene-induced Immunosuppression in Fish. Gainesville, FL.

June 2002: Yale University, Dept. of Occupational and Environmental Medicine -
Lessons on Human Health and Toxic Impact Learned from our Aquatic
Counterparts.

**Sept. 2001: Third International Meeting on Molecular Mechanisms of Metal
Toxicity and Carcinogenicity -** Immunodysfunction: An underlying Mechanism of
Metal Toxicity in Aquatic Organisms. Sardinia, Italy.

July 2001: Pollutant Responses in Marine Organisms - Immunotoxicology in fish -
Applications and Mechanisms of Response. Plymouth, England.

Oct. 2000: Conference on Women in Science - Aging: Good or Bad News for the
Immune Response. Rutgers University. New Brunswick, NJ.

**Oct. 2000: International Conference on Environmental and Occupational Lung
Disease -** Woodsmoke Impairs Host Resistance Against Pulmonary Infections in an
Animal Model. Lucknow, India.

May 2000: EPA-Duluth - Fish Immune Status: A Sensitive System for Assessing
Toxicological Impact of Aquatic Environments. Duluth, MN.

May 2000: University of Minnesota-Duluth - Processes and Mechanisms of
Woodsmoke-induced Immunosuppression. Duluth, MN.

March 2000: International Symposia on Medaka - Japanese Medaka: A Sensitive
Teleost Model for Assessing the Immunotoxic Effects of Potential Endocrine-
Disrupting Chemicals. Osaka, Japan.

Nov. 2000: The Fourth Princess Chulabhorn Science Congress- Immune System
Biomarkers for Predicting the Effects of Environmental Pollution. Bangkok, Thailand.

EDITOR/EDITORIAL BOARD APPOINTMENTS

Editor and Co-Editor:

Metal Toxicology, Co-Editor (Springer Publ.) – (2016)
Pulmonary Immunotoxicology (Klewar Publ.) - (2000)
Immunotoxicology of Occupational and Environmental Metals. (Taylor and Francis) -
(1998)
Ecotoxicology: Responses, Biomarkers and Risk Assessment. (SOS Publications) -
(1997)
Modulators of Immune Responses: A Phylogenetic Approach - Vol. 2 (SOS
Publications)-(1996)
Modulators of Immune Responses - Vol. 1 (SOS Publications) - (1994)
Toxicology and Ecotoxicology News (Taylor & Francis) - (1995-1998)
Book series on: Ecotoxicology (John Wiley & Sons) - (1995-1997)

Associate Editor-

Open Journal of Immunology (2015-2018)
Journal of Developmental Origins of Health & Disease (2012-2013; Themed Editor)
Journal of Toxicology and Applied Pharmacology – (2005-2014)
Journal of Toxicology and Environmental Health - Part A - (2001 - Present)
Biomarkers: Exposure, Effects and Susceptibility - (1995 – 2007)

Editorial Advisory Board-

Environmental Health Perspectives (2017-2020)
Open Journal of Toxicology (2015-present)
Inhalation Toxicology (2015-present)
Open Journal on Immunology (2009-present)
Journal of Immunotoxicology (2004 - 2016)

Toxicol. Sci. (2007-2016)
Toxicology (1997- 2016)
Environmental Health Perspectives (2009 – 2013; named a top reviewer for 2011)
Environmental Bioindicators (2005- 2011)
Inhalation Toxicology (2004 – 2008; 2013-2016)
Fish and Shellfish Immunology (1997 - 2008)
 Toxicology Applied Pharmacology (1996 - 2005)
 Diseases of Aquatic Organisms (1995 - 2006)
 Aquatic Toxicology (1998 - 2006)
 Journal of Toxicology and Environmental Health (1996 - 2001)
 Fish Immunology Technical Communications- Vols. 2-5 (1994 - 1997)

CHAired SESSIONS/MEETING ORGANIZER (1997 – present, descending order)

Outside University

- Organizer/Instructor of International Student & Faculty Workshop on "Fish Immunology" (Tasmania, Australia; February 1997)
- Organizer/Instructor of Student & Faculty Mini-workshop on "Fish Immunology" (Christ Church, New Zealand; February 1997)
- Chairperson at International Meeting on "Developmental and Comparative Immunology" (Williamsburg VA; July 1997)
- Organizer of Student & Faculty International Workshop on "Fish Immunotoxicology Techniques" (American College, Madurai India; February 1999).
- Organizer of Continuing Education Course on "Exposure Assessment: Methods and Applications" at Aquatic Toxicity Workshop Meeting (Edmonton, Canada; October 1999).
- Chairperson of Symposium on "Profiling Immunotoxicology" at Aquatic Toxicity Workshop Meeting (Edmonton, Canada; October 1999).
- International Conference on Environmental and Occupational Lung Disease (Lucknow, India; October, 2000)
- Symposium Coordinator/Chairperson at Society of Toxicology (1993, 1994, 1996-1999; 2005-2009)
- Continuing Education Coordinator/Chairperson at Society of Toxicology (1994, 1995, 2000, 2001)
- Slovenian Society of Toxicology (Nova Gorica, Slovenia; September 2004, 2005)
- Aerosol Dynamics and Health: Strategies to Reduce Exposure & Harm. (Chairperson, Public Health Issues Involving Environmental & Tobacco Aerosols; Cardiff, Wales 2008)
- SOT - Co-Chair, Symposia and Continuing Education Course, 2009, 2010, 2011, 2015, 2016, 2018, 2019
- ISEE/ISES – co-Chair, Symposia on Environmental Contamination and Indigenous populations. (Ontario, Canada, 2018)

FEDERAL & STATE ADVISORY BOARDS/PANELS/REGULATORY AGENCIES **(Contributions to Regulatory Guidelines)**

2018-2019: New York City Housing Authority, Advisory Board member for "Healthy Homes".

2017-2018: National Academy of Science, Engineering, Medicine –
-Board on Earth Sciences & Resources; Board on Environmental Studies & Toxicology; Board on Health Sciences Policy: Potential Human Health Effects of Surface Coal Mining Operations in Central Appalachia. 2017-2019.

2015: European Respiratory Society and Environment and Health Committee for American Thoracic Society. Position paper participant on “What constitutes an adverse health of air pollution?” Brussels, BE, March 2015.

2013: American Chemistry Council’s Center for Advancing Risk Assessment Science and Policy (ARASP) Workshop - Informing Risk Assessment: Understanding and Communicating Uncertainty in Hazard Assessment. (2013)

2011: Department of Defense

- Gulf War Illness Peer Review Panel (2011)

2013: FDA, Tobacco Control Division, Advisory Consultant (2013)

2013-2006: NASA

- Lunar Dust Exposure Standard Review Panel (2013)
- Lunar Science Institute, Moon Science Grant Review Panel (2008)
- Lunar Dust Non-Advocate Review Panel (Chair, 2006-2008)

2002-2012: National Academy of Science

- National Research Council (NRC): Committee on Low Level Lead in Ammunition (2011 – 2012)
- National Research Council (NRC): Peer Review of NRC Report on Acute Exposure Guideline Levels (2010)
- Institute of Medicine (IOM): Peer Review of IOM Report on Depleted Uranium final document (2008)
- National Research Council (NRC) - Committee on Toxicology/Subcommittee on Spacecraft Water Exposure Guidelines (2001 - 2008)
- Institute of Medicine (IOM): Committee on Gulf War and Health - Part 3 (2002 – 2004)
- Institute of Medicine (IOM): Reviewer for Agent Orange final document (2003)

2012-2010: National Toxicology Program, Science Advisory Board (2010-2012)

1996-2017: National Institute of Health (NIH) & National Institute of Environmental Health Science (NIEHS)

NIEHS, Member reviewer for Core Centers (2018)

-NIEHS, Study Section member (2015-2017)

- NIEHS KO1, K99, R23 reviewer (2014, 2015)
- NIEHS KO1, K99 Awards member (2013)
- NIEHS Immunotoxicology Center Program (2012, 2013)
- NIEHS Oceans Centers (2012)
- NIEHS Just-in-time Grants (**Chair**, 2012)
- NIH College of Scientific Reviewers (2010 – 2013)
- NIH Integrative & Comparative Endocrinology (2011)

- NIEHS Time Sensitive Grant (**Chair**; 2010)
- NIEHS P30 (NIEHS Centers of Excellence), (2008, 2009)
- NIEHS Challenge Grants, (2009)
- NIEHS K01 grant applications, (2008)
- NIH Innate Immunity and Inflammation (III) Study Section Full Member, (2005 – 2007)
- NIEHS Program Project grants, (2006)
- NIEHS ALTX – 4 (Alcohol and Toxicology) Study Section Full Member, (1996 – 2000)

2005: National Institute of Environmental Health Sciences (NIEHS) & U.S.EPA & NASA

- Expert Panel on “Global Earth Observations: Application to Air Quality and Human Health” (2005)

2005: National Institute of Allergy & Infectious Disease (NIAID) & Department of Defense (DOD)

- Expert Panel Workshop on Pulmonary Threat Agents (2005)

2013-210: New Jersey Department of Environmental Protection

- Human health Committee (2010 – 2013)
- Soil Standards Sub-committee (2010 – 2011)
- Aerosol Sub-committee (2011 – 2012)

2011-2011: United Nations Environmental Program (UNEP) Steering Committee (2006 – 2011)

- Atmospheric Brown Cloud Human Health Panel

2004-2005: U.S. EPA Science Advisory Board & Review Panel

- Metals Risk Assessment Framework Review Panel, (**Co-Chair** of Human Health Breakout Group, 2004 – 2005)
- Nanoparticle Review Panel (2005)

APPOINTMENTS/ELECTED OFFICES

Society of Toxicology (SOT)

Nominating Committee (2018-2020)

Committee for Diversity Initiatives (2014-2015, member; 2015-2016, Co-chair; 2015-2016; Chair, 2016--2017)

*Board of Councilors (2011 – 2014; **Secretary-elect**, 2011-2012; **Secretary**, 2012-2014)*

Nominating Committee (2007 - 2009)

Congressional Representative (2004 – 2005)

*Education Committee (2002 – 2005; **Chair**, 2004 – 2005)*

*Education Sub-Committee for Minority Initiatives (2001 - 2004; **Chair**, 2003-2004)*

*Continuing Education Committee (1998 - 2001; **Chair**, 1999 - 2000)*

Program Committee (1995-1998)

Inhalation & Respiratory Specialty Section

Councilor (2017-2019)

Ethical and Legal Specialty Section

President (2017-2018)
VP-elect (2016)

Immunotoxicology Specialty Section

President (1999-2000)
Vice-President (1998-1999)
Secretary/Treasurer (1995-1997)
Program Committee (1993-1999)
Awards Committee (1993, 1998, 2000)
Education Committee (Chair, 1992-1996; 2004-2009)
Nominating Committee (1998 - 2001, Chair, 1999-2000)
Councilor (2000-2001)

Metals Specialty Section

President (2003-2004)
Vice President (2002-2003)
Awards Committee (**Chair**, 2001 - 2004)
Program Committee (**Chair**, 2001 - 2004)
Nominating Committee (2001 – 2004, **Chair**, 2001-2003)

MidAtlantic (Chapter) Society of Toxicology (MASOT)

Nominating Committee (2009 [**Chair**], 2010, 2011)
Past president, Councilor (2009-2010)
President (2008-2009)
Vice President (2007-2008)
Vice President-elect (2006-2007)
Councilor (2001 - 2004)
Program Committee (2000 – Present; Chair 2006-2007)

NYU Langone School of Medicine

Faculty Council Representative (2010-2019; Vice President 2011-2012, 2014-2015);
Benefits and Tenure Sub-committee (2015-2016)
Academic Affairs Sub-committee (Chair, 2012-Present)
Basic Science Sub-committee (co-Chair, 2017-2019)

IACUC Review Board (2009-2011; 2017-2019)

Grievance Committee (2017-2020)

NYU Senate (alternate; 2018-2021)

Department of Environmental Medicine

Promotion & Tenure Committee (2008-2014; **Chair**, 2010-2012)
Search Committee (2010-2013)
Biological Safety Committee- (**Chair**, 1990-1999)
Graduate Steering Committee (1999- 2014; Interim **Co-chair** 2001-2002)
Toxicology Masters' Program (Director, 2002 – 2008; **Co-director**, 2008-2011)

GRANT REVIEWER *Ad hoc* (Federal [Non-NIH]/State/Private):

Federal

Scandinavian Research Program (2013, 2016)
NASA, Moon dust program (2008)
Canadian Centers for Research (2000 – 2004)
DOD (*Ad hoc*, 1999 - present)

EPA (*Ad hoc*, 2002 - present)
Natural Sciences and Engineering Research Council of Canada (*Ad hoc*, 2002 – present)

State/Private

Center for Indoor Air Research
Environmental and Occupational Science Health Inst. (Rutgers U.)
IFS Research Grants for Developing Nations
Johns Hopkins Pilot Projects
Michigan Sea Grant
New Jersey Sea Grant
New York Sea Grant
Philip Morris Foundation

ADJUNCT APPOINTMENTS, CONSULTING, ADVISORY BOARDS

- **Weill Cornell Medical School** (NY, NY) – External Advisory Board for NIH Diversity Grant (2013-2015)
- **Chulabhorn Research Institute & University** (Bangkok, Thailand) - Adjunct Professor (2003-present)
- **Cornell University, Inst. for Comparative and Environmental Toxicology** (Ithaca, NY) - Adjunct Professor (1996-2005)
- **American Lung Association** - Criteria Document on Woodsmoke (2001)
- **Fish and Wildlife Services** - Status of the Hudson River (2000)
- **International Life Sciences Institute** - Research strategy on age-related differences in susceptibility (1998)
- **Stratus Consulting Inc.** - Assessment of PCB-contaminated sites (1997 - 2000)
- **U.S. EPA** - Criteria document on the immunotoxicity of endocrine disruptors (1997)

MENTORING ON A GLOBAL LEVEL (6)

- Juliet Igbo (Doctoral student co-mentor – U. of Lagos, Nigeria – 2015-2019)
- Anishka Lewis (Masters student- Jamaica – 2014)
- LeighAnn Koekemoer (Masters student – South Africa-2014)
- Dr. Orish Orisakwe – University of Port Harcourt, Nigeria – 2013-present)
- Dr. Hari Jott Dosih (Nepal Health Research Council – Kathmandu, Nepal- 2014-present)
- Dr. Chanthana Tangjarukij (Chulabhorn Research Institute – Bangkok, Thailand- 2012-present)

STUDENT & JUNIOR FACULTY MENTORING

Research Advisor:

College and High School (15)

- Aaron Asiedu-Wiafe (2017-2018; Monroe-Woodbury High School, Monroe, NY)
- Aastha Parikh (2016-2017; Monroe-Woodbury High School, Monroe, NY)
- Daniel Smith (2013-2014; Fairlawn High School, Fairlawn, NJ)
- Alejandro Jorge (2012; Ramapo College, NJ)
- Eric Bloom (2011-2012; Highland Mills High School [Highland Mills, NY])
- Sujay Avencar (2009-2011; Suffern High School [Suffern, NY])
- Sam Openheim (2009-2011; Suffern High School [Suffern, NY])
- Monica Feldman (2007-2009; Spring Valley High School [Spring Valley, NY])

- George Markt (2005-2009; Ramapo High School [Ramapo, NY])
- Payal Roy (2006 – 2007; New York University [NY, NY])
- Rebecca Kurtzman (2005 – 2007; Spring Valley High School [Spring Valley, NY])
- Erica Stone (2006, Ramapo College [Mahwah, NJ])
- Elizabeth Nadziejko (2000; Washingtonville High School [Washingtonville, NY])
- Kevin Hazard (1999 – 2000; Spring Valley High School [Spring Valley, NY])
- Songeeta Pachachuria (1997-2000; Spring Valley High School, [Spring Valley, NY])

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Post-Baccalaureate (2)

- *Parnavi Desai* (2015-present; NYU, Biology)
- *Tomas Dunne* (2014-2015; Penn State)

Masters (30)

- Arianna Schwartzer (2017-2019; NYU Environ. Health Sci)
- Kathryn Fetce (2016-2018; NYU Environmental Health Sciences)
- Nicholas Lawrence (2016-2018; NYU Environmental Health Sciences)
- Alexander Lucca (2017-2018; NYU Biology)
- Annie J. Thaikkatil (2016-2017; NYU Biology)
- Leena Babiker (2017-2018; NYU Biology)
- Patricia Costa (2014-2016; NYU Environ. Health Sci)
- Maria Putilina (2013-2014-NYU, Biology)
- Kirtan Kaur (2013-2015)
- Sarah Attreed (2013-2015)
- Sabina Sutjec (2013-2014-NYU, Biology)
- Kaitlyn Koenig (2012-2014)
- Heather Larkin (2012-2013-NYU, Biology))
- Dana Lauterstein (2011-2013) – 2 SOT student awards (2013)
- Yi-Chuh Chen (2010-2011 Incomplete-NYU Biology)
- Ya-Chien Yu (2010-2011-IncompleteNYU Biology)
- Yuan-Chun Hsiao (2010-2011-Incomplete NYU Biology)
- Lauren Rosenblum (2009-2011-NYU Biology)
- Sandra Perella (2008-2010)
- Kotaro Hoshido (2007-2009-NYU Biology)
- Jacqueline Grabowski (2006-2008)
- Elizabeth Vanza (2004 – 2006) – *SOT student award (2006)*
- Elizabeth Berg (2003 - 2005)
- Shannon Doherty (2002 - 2005)
- Colette Prophete (1998 - 2001)
- Jessica Duffy (1999 - 2001)
- Migali Jorge (1998 - 2000)
- Cheryl Premdass (1998 - 2000)
- Andrea Raymond (1997 - 2000) – *1 SOT award*
- Thomas McManus (1994 – 1996, Co-advisor)

Doctorate (9)

- Pamela Tijerna (2013-present) – *SOT CDI award (2014); SOT (1st place Hispanic Organization of Toxicology, 2015); SOT(Mary Amdur Inhalation Fellowship, 2015)*
- Dana Lauterstein (2013-present)- *SOT (Safety Assessment Specialty Section, 2015)*
- Juliett Igbo (2015-2016), Co-Advisor (U. of Lagos, Nigeria)
- Sheung Pui Ng (2004 - 2010) – *9 SOT student awards including Novartis Achievement Award (2008-2010)*
- Jessica Duffy (2001 – 2007) – *2 SOT awards (2004); 3 SETAC awards (2004, 2005, 2006)*
- Chanthana Settachan (Co-Advisor; 2003 – 2009; Chulabhorn Research Institute, Bangkok Thailand)
- Erik Carlson (1999- 2003) – *1 SOT award (2000)*
- Ninah Enane (Co-Advisor, 1995 - 1999)
- Peter Atkins (Co-Advisor, 1992 - 1996)

Post-doctoral Trainees (2) & Mentoring Committees

- Jason Blum (2009 – 2012) – *1 SOT post-doc award*
- Daniel Willis (2011 – 2013)- *NSF/FDA post-doctoral fellowship (Zelikoff, PI)- 2013*

Junior Faculty Mentoring Committee (2)

- Jason Blum (2012 – Present)
- Kevin Cromar (2012-Present)

Doctoral Thesis Committee (12):

- Kirtan Kaur (2016-2018, Chair)
- Carolyn Klocke (2015-2017) – University of Rochester (External Examiner)
- Mary Francis (2015-2016) - Rutgers University (External Examiner)
- Eric Saunders (2012-2015)
- Joshua Vaughn (2012 – 2015)
- AJ Cuevas (2007 – 2012)
- Jessica Lyon (2007 - 2012)
- Judy Blatt Nichols (Chair, 2007 – 2011)
- Patricia Gillespie (2006 - 2010)
- Elizabeth Vanza (Chair, 2004 – 2009)
- Ann Zulkosky (2005 – 2007; SUNY Stony Brook)
- Samantha DeLeon (Chair, 1999 – 2003)

COMMUNITY OUTREACH, EDUCATION & ENGAGEMENT INITIATIVES:

- **Director**, *Community Outreach & Education Program, NYU, Dept. of Environ. Med. (2005- present)*
- **Director**, *NIEHS Center of Excellence, Community Outreach & Engagement Program, NYU, Dept. of Env. Med. (2005 – present)*
- **Director**, *NIEHS Superfund Community Outreach and Education Core, NYU, Dept. of Environ. Med. (2005- 2010)*

- **Co-director**, NIEHS Superfund Translation Core, *NYU, Dept. of Environ. Med.* (2005- 2011)

Community Partners:

- *Ironbound Community Corporation (ICC): Newark, NJ (2015-present)*
- *Ramapough Lenape Tribal Nation: Ringwood, NJ/Mahwah, NJ/Hillburn, NY (2013-present)*
- *City of Garfield, NJ (2012-present)*
- *Susquehanna, PA: Fracking communities (2015-2016)*
- *Flint, Michigan via Water Defense*

Translation/Communication of toxicology to non-toxicologists & underserved minorities

- Community groups in PA and NY: Environmental and Health Implications of Hydraulic Fracturing (2013-2014).
- Ramapo Indians: Living on a Superfund Site (2014-present)
- NY Presbyterian Lang Program for Underserved Youth (2010 - Present)
- *Harlem Children Society Mentoring Program - Bronx, NY (2010-Present)*
- Y-2 Kids (NY State 4th – 12th grade, Career day representative, 2008 - Present)
- *Center for Talented Youth, New York University Department of Environmental Medicine & Johns Hopkins Center for Talented Youth (2005 – Present)*
- *Environmental Commission of Ramsey (2001 – 2007; Vice-Chair; 2004-2006)* - Ramsey, New Jersey. Woodburning: A Cozy Atmosphere or a Public Menace? (2003)
- *Senior Citizen Advisory Board of Ramsey (2003 - 2005)*
- *Ramsey High School (Presenter on toxicology and the environment 2005-2006)*
- *Youth Guidance Commission of Ramsey (1999 - 2001)*
- *Rotary Club, Goshen, New York. Woodburning: A Cozy Atmosphere or a Public Menace? (2003)*
- *Upper Saddle River Community Center, Upper Saddle River, New Jersey. The Hazards of Woodburning (1997)*

Non-Academic Related Outreach Committees:

- 2011- 2014 – *Board of Ethics*, Community Hospice of Bergen County (NJ)
- 2009- 2014 – *Fundraising Committee*, Community Hospice of Bergen County (NJ)
- 2006-2013 – President, Condominium Association
- 2013-2016 – Vice-President, Condominium Association
- 2018 – South Bronx Asthma Coalition

Exhibit B

MATERIALS AND DATA CONSIDERED

Literature

- Abraham, J.L., and D.D. McEuen. "Inorganic Particulates Associated with Pulmonary Alveolar Proteinosis: SEM and X-Ray Microanalysis Results." *Appl. Pathol.* 4 (1986): 138-146.
- Abubaker, Kalid, Rodney B. Luwor, et al. "Inhibition of the JAK2/STAT3 pathway in ovarian cancer results in the loss of cancer stem cell-like characteristics and a reduced tumor burden." *BMC Cancer* No. 14 (2014): 317.
- Abubaker, Kalid, Rodney B. Luwor, et al. "Targeted disruption of the JAK2/STAT3 pathway in combination with systemic administration of paclitaxel inhibits the priming of ovarian cancer stem cells leading to a reduced tumor burden." *Frontiers in Oncology* No. 4(75) (2014).
- Acheson, E D, M J Gardner, E C Pippard, and L P Grime. "Mortality of Two Groups of Women Who Manufactured Gas Masks from Chrysotile and Crocidolite Asbestos: A 40-Year Follow-Up." *British Journal of Industrial Medicine*, No. 39 (1982): 344-48.
- Acencio, Milena M. P., Evaldo Marchi, Lisete R. Teixeira, Bruna Rocha Silva, Juliana Sanchez Silva, Carlos Sergio Rocha Silva, Vanessa Adelia Alvarenga, Leila Antonangelo, Francisco Suso Vargas, and Vera Luiza Capelozzi. "Talc Particles and Pleural Mesothelium Interface Modulate Apoptosis and Inflammation." *Pathology* 46, no. S2 (2014): S76.
- Akhtar, Mohd Javed, Maqsood Ahamed, M.A. Majeed Khan, Salman A. Alrokayan, Iqbal Ahmad, and Sudhir Kumar. "Cytotoxicity and Apoptosis Induction by Nanoscale Talc Particles from Two Different Geographical Regions in Human Lung Epithelial Cells." *Environmental Toxicology* 29 (2014): 394-406. <https://doi.org/10.1002/tox.21766>.
- Akhtar, Mohd Javed, Sudhir Kumar, et al. "The primary role of iron-mediated lipid peroxidation in the differential cytotoxicity caused by two varieties of talc nanoparticles on A549 cells and lipid peroxidation inhibitory effect exerted by ascorbic acid." *Toxicology in Vitro* No. 24 (2010): 1139-1147.
- Allaire, Guy S., Zachary D. Goodman, Kamal G. Ishak and Lionel Rabin. "Talc in Liver Tissue of Intravenous Drug Abusers with Chronic Hepatitis." *Am J Clin Pathol* 92 (1989): 583-588.
- American Thoracic Society. "Health Effects of Tremolite." *Medical Section of the American Lung Association* (1991).
- Arellano-Orden, Elena, Auxiliadora Romero-Falcon, Jose Martin Juan, Manuel Ocana Jurado, Francisco Rodriguez-Panadero, and Ana Montes-Worboys. "Small Particle-Size Talc Is Associated with Poor Outcome and Increased Inflammation in Thoracoscopic Pleurodesis." *Respiration* 86 (2013): 201-9. <https://doi.org/10.1159/000342042>.
- "ATSDR - Toxicological Profile: Asbestos." Accessed August 16, 2018. <https://www.atsdr.cdc.gov/toxprofiles/tp.asp?id=30&tid=4>.
- Aust, Ann, James C. Ball, Autumn A. Hu, JoAnn S. Lighty, Kevin R. Smith, et al. "Particle Characteristics Responsible for Effects on Human Lung Epithelial Cells." *HEI* 110 (December 2002).
- Aust, Ann E., Philip M. Cook, and Ronald F. Dodson. "Morphological and Chemical Mechanisms of Elongated Mineral Particle Toxicities." *Journal of Toxicology and Environmental Health, Part B* 14, (2011): 40-75.

- Baan, Robert, Kurt Straif, Yann Grosse, Béatrice Secretan, Fatiha El Ghissassi, and Vincent Coglian. "Carcinogenicity of Carbon Black, Titanium Dioxide, and Talc." *The Lancet Oncology* 7, No. 4 (April 2006): 295–96.
- Baandrup, Louise, Mette T. Faber, Jane Christensen, Allan Jensen, Klaus K. Andersen, Søren Friis, and Susanne K. Kjaer. "Nonsteroidal Anti-Inflammatory Drugs and Risk of Ovarian Cancer: Systematic Review and Meta-Analysis of Observational Studies." *Acta Obstet Gynecol Scand* 92, No. 3 (March 2013): 245–55.
- Balkwill, Fran, and Alberto Mantovani. "Inflammation and Cancer: Back to Virchow?" *The Lancet* 357, No. 9255 (February 2001): 539–45.
- Basuli, D., L. Tesfay, Z. Deng, B. Paul, Y. Yamamoto, G. Ning, W. Xian, F. McKeon, M. Lynch, C.P. Crum, et al. "Iron Addiction: A Novel Therapeutic Target in Ovarian Cancer." *Oncogene* 36, (2017): 4089-99.
- Beck, Barbara D., Henry A. Feldman, Joseph D. Brain et al. "The Pulmonary Toxicity of Talc and Granite Dust as Estimated from an in Vivo Hamster Bioassay." *Toxicology and Applied Pharmacology*, 87 (1987): 222-234.
- Begg, Melissa D., and Dana March. "Cause and Association: Missing the Forest for the Trees." *American Journal of Public Health* 108, No. 5 (May 2018): 620.
- Belotte, Jimmy, Nicole M. Fletcher, Awoniyi O. Awonuga, Mitchell Alexis, Husam M. Abu-Soud, Ghassan M. Saed, Michael P. Diamond, and Mohammed G. Saed. "The Role of Oxidative Stress in the Development of Cisplatin Resistance in Epithelial Ovarian Cancer." *Reproductive Sciences* 21, no. 4 (2014): 503–8.
<https://doi.org/10.1177/1933719113503403>.
- Berge, Wera, Kenneth Mundt, Hung Luu, and Paolo Boffetta. "Genital Use of Talc and Risk of Ovarian Cancer: A Meta-Analysis." *European Journal of Cancer Prevention*, 2017, 1.
- Berry, G., M.L. Newhouse and J.C. Wagner. "Mortality from All Cancers of Asbestos Factory Workers in East London 1933-80." *Occup Environ Med* 57, No. 11 (November 1, 2000): 782–85.
- Bertolotti, Marinella, Daniela Ferrante, Dario Mirabelli, Mario Botta, Marinella Nonnato, Annalisa Todesco, Benedetto Terracini, and Corrado Magnani. "[Mortality in the cohort of the asbestos cement workers in the Eternit plant in Casale Monferrato (Italy)]." *Epidemiologia E Prevenzione* 32, no. 4–5 (October 2008): 218–28.
- Blejer, Hector P., and Robert Arlon. Talc: A Possible Occupational and Environmental Carcinogen." *Journal of Occupational Medicine* 15, No. 2 (February 1973): 92-97.
- Blount, A M. "Amphibole Content of Cosmetic and Pharmaceutical Talcs." *Environmental Health Perspectives* 94 (August 1991): 225–30.
- Bluemel, Piza, and Zischka-Konorsa, W. "Animal experimental investigations of tissue reactions to starch and talcum powder after intraperitoneal application." *Wiener klinische Wochenschrift* 74, no. 1 (January 1962).
- Blumenkrantz, M. J., N. Gallagher, R. A. Bashore, and H. Tenckhoff. "Retrograde Menstruation in Women Undergoing Chronic Peritoneal Dialysis." *Obstetrics and Gynecology* 57, no. 5 (May 1981): 667–70.
- Bogatu, Bettina, Bodo Contag, et al. "Adsorption of Lipoproteins onto Mineral Dust Surfaces: A Possible Factor in the Pathogenesis of Particle-induced Pulmonary Fibrosis?" *Z. Naturforsch* 60c, (2005): 792-798.
- Boorman, G. A., and J. C. Seely. "The Lack of an Ovarian Effect of Lifetime Talc Exposure in F344/N Rats and B6C3F1 Mice." *Regulatory Toxicology and Pharmacology: RTP* 21,

- no. 2 (April 1995): 242–43. <https://doi.org/10.1006/rtp.1995.1035>.
- Booth, M, V Beral, and P Smith. “Risk Factors for Ovarian Cancer: A Case-Control Study.” *British Journal of Cancer* 60, No. 4 (October 1989): 592–98. <https://doi.org/10.1038/bjc.1989.320>.
- British Thoracic Association “A Survey of the Long-Term Effects of Talc and Kaolin Pleurodesis.” *British Journal of Diseases of the Chest* 73 (1979): 285–88. [https://doi.org/10.1016/0007-0971\(79\)90054-8](https://doi.org/10.1016/0007-0971(79)90054-8).
- Bunderson-Schelvan, Melisa, Jean C. Pfau, Robert Crouch, and Andrij Holian. “Nonpulmonary Outcomes of Asbestos Exposure.” *Journal of Toxicology and Environmental Health, Part B* 14, No. 1–4 (May 2, 2011): 122–52.
- Buz’Zard, Amber R., and Benjamin H. S. Lau. “Pycnogenol® Reduces Talc-Induced Neoplastic Transformation in Human Ovarian Cell Cultures.” *Phytother. Res.* 21, No. 6 (June 2007): 579–86.
- Camargo, M. Constanza, Leslie T. Stayner, Kurt Straif, Margarita Reina, Umaina Al-Alem, Paul A. Demers, and Philip J. Landrigan. “Occupational Exposure to Asbestos and Ovarian Cancer: A Meta-Analysis.” *Environ Health Perspect* 119, No. 9 (September 2011): 1211–17.
- Carr, C.J. “Talc: Consumer Uses and Health Perspectives” 21 (1995): 211–15.
- Chan, J.K., Munro, E.G., Cheung, M.K., Husain, A., Teng, N.N., Berek, J.S., Osann, K. Association of lymphadenectomy and survival in stage I ovarian cancer patients. *Obstet Gynecol.* 2007. Jan; 109(1):12-9.
- Chan, J.K., Munro, E.G., Cheung, M.K., Husain, A., Teng, N.N., Berek, J.S., Osann, K. Association of lymphadenectomy and survival in stage I ovarian cancer patients. *Obstet Gynecol.* 2007. Jan; 109(1):12-9.
- Chang, Che-Jui, Yu-Kang Tu, Pau-Chung Chen, and Hsiao-Yu Yang. “Occupational Exposure to Talc Increases the Risk of Lung Cancer: A Meta-Analysis of Occupational Cohort Studies.” *Canadian Respiratory Journal* 2017 (2017): 1–12.
- Chang, Stella, and Harvey A. Risch. “Perineal Talc Exposure and Risk of Ovarian Carcinoma.” *Cancer* 79, No. 12 (June 15, 1997): 2396–2401.
- Chen, L-M, et al. “Epithelial Carcinoma of the Ovary, Fallopian Tube, and Peritoneum: Epidemiology and Risk Factors - UpToDate,” 2018. https://www.uptodate.com/contents/epithelial-carcinoma-of-the-ovary-fallopian-tube-and-peritoneum-epidemiology-and-risk-factors?search=Epithelial%20carcinoma%20of%20the%20ovary,%20fallopian%20tube,%20and%20peritoneum:%20Epidemiology%20and%20risk%20factors&source=search_result&selectedTitle=1~150&usage_type=default&display_rank=1.
- Chen, Yong, Pao-Chen Wu, Jing-He Lang, Wen-Jun Ge, Patricia Hartge and Louise A. Brinton. “Risk Factors for Epithelial Ovarian Cancer in Beijing, China.” *International Journal of Epidemiology* 21, No. 1 (1992): 23-29.
- Chow, M.T., Moller, A., Smyth, M.J. Inflammation and immune surveillance in cancer. *Seminars in Cancer Biology.* 2012. 22:23-32.
- Churg, Andrew and Martha L. Warnock. “Analysis of the Cores of Ferruginous (Asbestos) Bodies from the General Population.” *Laboratory Investigation* 40, No. 5 (1979): 622-26.
- Clin, B., F. Morlais, B. Dubois, A.-V. Guizard, N. Desoubreux, M.-F. Marquign, C. Raffaellis, C. Paris, F. Galateau-Salle, G. Launoy and M. Letourneux. “Occupational Asbestos Exposure and Digestive Cancers – A Cohort Study.” *Alimentary Pharmacology &*

- Therapeutics* 30, (2009): 364-74.
- Coggiola, Maurizio, Davide Bosio, Enrico Pira, Pier Giorgio Piolatto, Carlo La Vecchia, Eva Negri, Marco Michelazzi, and Alessandro Bacaloni. "An Update of a Mortality Study of Talc Miners and Millers in Italy." *American Journal of Industrial Medicine* 44, No. 1 (July 2003): 63-69.
- Committee on Practice Bulletins-Gynecology, Committee on Genetics, Society of Gynecologic Oncology. "Practice Bulletin No 182: Hereditary Breast and Ovarian Cancer Syndrome." *Obstetrics and Gynecology* 130, no. 3 (2017): e110-26.
<https://doi.org/10.1097/AOG.0000000000002296>.
- Cook, Linda S., Mary L. Kamb, and Noel S. Weiss. "Perineal Powder Exposure and the Risk of Ovarian Cancer." *Am J Epidemiol* 145, No. 5 (March 1, 1997): 459-65.
- Coussens, L.M., and Werb, Z. (2002). Inflammation and cancer. *Nature* 420, 860-867.
- Cox, Mary Jude, Julia A. Woods, Steven Newman, Richard F. Edlich. "Toxic Effects of Surgical Glove Powders on the Eye." *Journal of Long-Term Effects of Medical Implants* 6, Nos. 3 and 4 (1996): 219-226.
- Cralley, L.J., M.M. Key, D.H. Groth, W.S. Lainhart and R.M. Ligo. "Fibrous and Mineral Content of Cosmetic Talcum Products." *American Industrial Hygiene Association Journal* (July-August 1968): 350-354.
- Cramer, D. W. "Perineal Talc Exposure and Subsequent Epithelial Ovarian Cancer: A Case-Control Study." *Obstetrics and Gynecology* 94, no. 1 (July 1999): 160-61.
- Cramer, Daniel W., William R. Welch, Ross S. Berkowitz, John J. Godleski. "Presence of Talc in Pelvic Lymph Nodes of a Woman With Ovarian Cancer and Long-Term Genital Exposure to Cosmetic Talc." *Obstetrics & Gynecology* 110, (2007): 498-501.
- Cramer, Daniel W, and Olivera J Finn. "Epidemiologic Perspective on Immune-Surveillance in Cancer." *Curr Opin Immunol* 23, No. 2 (April 2011): 265-71.
- Cramer, Daniel W., Rebecca F. Liberman, Linda Titus-Ernstoff, William R. Welch, E. Robert Greenberg, John A. Baron, and Bernard L. Harlow. "Genital Talc Exposure and Risk of Ovarian Cancer." *Int. J. Cancer* 81, No. 3 (May 5, 1999): 351-56.
- Cramer, Daniel W., Linda Titus-Ernstoff, John R. McKolanis, William R. Welch, Allison F. Vitonis, Ross S. Berkowitz, and Olivera J. Finn. "Conditions Associated with Antibodies Against the Tumor-Associated Antigen MUC1 and Their Relationship to Risk for Ovarian Cancer." *Cancer Epidemiology Biomarkers & Prevention* 14, no. 5 (May 1, 2005): 1125-31. <https://doi.org/10.1158/1055-9965.EPI-05-0035>.
- Cramer, Daniel W., Allison F. Vitonis, Kathryn L. Terry, William R. Welch, and Linda J. Titus. "The Association Between Talc Use and Ovarian Cancer: A Retrospective Case-Control Study in Two US States." *Epidemiology* 27, No. 3 (May 2016): 334-46.
- Cramer, Daniel W., William R. Welch, Robert E. Scully, and Carol A. Wojciechowski. "Ovarian Cancer and Talc. A Case-Control Study." *Cancer* 50, No. 2 (July 15, 1982): 372-76.
- Crusz, Shanthini M., Frances R. Balkwill. "Inflammation and cancer: advances and new agents." *Nat. Rev. Clin. Oncol.* 12 (2015):584-596.
- Cubillos-Ruiz, Juan R., Pedra C. Silberman, et al. "ER Stress Sensor XBP1 Controls Anti-tumor Immunity by Disrupting Dendritic Cell Homeostasis." *Cell* 161, (June 2015): 1527-1538.
- Davies, R., J.W. Skidmore, D.M. Griffiths and C.B. Moncrieff. "Cytotoxicity of Talc for Macrophages in Vitro." *Fd. Chem. Tox.* 21, No. 2 (1983): 201-207.
- De Boer, C. H. "Transport Of Particulate Matter Through The Human Female Genital Tract." *J. Reprod. Fert.* 28, (1972): 295-297.

- De Mattia G, Bravi MC, Laurenti O, De Luca O, Palmeri A, Sabatucci A, Mendico G, Ghiselli A. Impairment of cell and plasma redox state in subjects professionally exposed to chromium. *Am J Ind Med*. 2004; 46(2):120–125.
- Denkhaus, E., K. Salnikow “Nickel essentiality, toxicity, and carcinogenicity.” *Oncology/Hematology* No. 42 (2002): 35–56.
- DeSesso, John M. “Exponent Talc Defense Presentation Toxic Talc?” January 18, 2018.
- Di Cristo, Luisana, Dania Movia, Massimiliano G. Bianchi, Manfredi Allegri, Bashir M. Mohamed, Alan P. Bell, Caroline Moore, et al. “Proinflammatory Effects of Pyrogenic and Precipitated Amorphous Silica Nanoparticles in Innate Immunity Cells.” *Toxicological Sciences* 150, No. 1 (March 2016): 40–53.
- Dion, Chantal, Guy Perrault, Mounia Rhazi. Institut de recherche Robert-Sauve en sante et en securite du travail (IRSST). “Synthesis of Knowledge on Tremolite in Talc.” *Chemical Substances and Biological Agents: Studies and Research Projects* Report R-755, (2012): 1-98.
- Dixon, Suzanne C., Christina M. Nagle, Nicolas Wentzensen, Britton Trabert, Alicia Beeghly-Fadiel, Joellen M. Schildkraut, Kirsten B. Moysich, et al. “Use of Common Analgesic Medications and Ovarian Cancer Survival: Results from a Pooled Analysis in the Ovarian Cancer Association Consortium.” *British Journal of Cancer* 116, no. 9 (April 25, 2017): 1223–28. <https://doi.org/10.1038/bjc.2017.68>.
- Dodson, Ronald F., Michael O’Sullivan, Carolyn J. Corn, and Samuel P. Hammar. “Quantitative Comparison of Asbestos and Talc Bodies in an Individual with Mixed Exposure.” *American Journal of Industrial Medicine* 27, No. 2 (February 1995): 207–15.
- Dreher, R., H.U. Keller, M.W. Hess, B. Roos and H. Cottier. “Early Appearance and Mitotic Activity of Multinucleated Giant Cells in Mice after Combined Injection of Talc and Prednisolone Acetate.” *International Academy of Pathology* 38, No. 2 (1978): 149-156.
- Driscoll, K. “Effects of Particle Exposure and Particle-Elicited Inflammatory Cells on Mutation in Rat Alveolar Epithelial Cells.” *Carcinogenesis* 18, No. 2 (February 1, 1997): 423–30.
- Duda-Chodak, Aleksandra, Urszula Blaszczyk. “The Impact of Nickel on Human Health.” *J. Elementol*. No. 13(4) (2008): 685-696.
- Edelstam, G. A. B., A. C. E. Sjosten, H. Ellis. “Retrograde Migration of Starch in the Genital Tract of Rabbits.” *Inflammation* Vol. 21, No. 5 (1997): 489-499.
- Egilman, David “The Production of Corporate Research to Manufacture Doubt About the Health
- Egli, G. E., and M. Newton. “The Transport of Carbon Particles in the Human Female Reproductive Tract.” *Fertility and Sterility* 12 (April 1961): 151–55.
- Elder, A., Gelein, R., Silva, V., Feikert, T., Opanashuk, L., Carter, J., Potter, R., Maynard, A., Ito, Y., Finkelstein, J., Oberdorster, G. Translocation of inhaled ultrafine manganese oxide particles to the central nervous system. *Environ Health Perspect*. 2006. 114:1172-1178.
- Hazards of Products: An Overview of the Exponent BakeliteVR Simulation Study.” *NEW SOLUTIONS: A Journal of Environmental and Occupational Health Policy* Vol. 28(2) (2018): 179–201.
- Endo-Capron, S., A. Renier, X. Janson, L. Kheuang, and M.C. Jaurand. “In Vitro Response of Rat Pleural Mesothelial Cells to Talc Samples in Genotoxicity Assays (Sister Chromatid Exchanges and DNA Repair).” *Toxicology in Vitro* 7, No. 1 (January 1993): 7–14.
- Eng, Kevin H., J. Brian Szender, John Lewis Etter, Jasmine Kaur, Samantha Poblete, Ruea-Yea Huang, Qianqian Zhu, et al. “Paternal Lineage Early Onset Hereditary Ovarian Cancers:

- A Familial Ovarian Cancer Registry Study.” *PLoS Genetics* 14, no. 2 (February 2018): e1007194. <https://doi.org/10.1371/journal.pgen.1007194>.
- Enticknap, J.B. and W.J. Smither. “Peritoneal Tumours in Asbestosis.” *British Journal of Industrial Medicine* 21 (1964): 20-31.
- EPA. “Drinking Water Standard for Arsenic.” (January 2001).
- EPA. “Health Assessment Document for Talc.” (March 1992).
- European Center for Ecotoxicology and Toxicology of Chemicals. “Evaluation of Systemic Health Effects Following Dermal Exposure to Chemicals.” Technical Report No. 119 ISSN-0773-8072-119 (March 2013).
- Fang, Zhijia, Min Zhao, et al. “Genotoxicity of Tri- and Hexavalent Chromium Compounds In Vivo and Their Modes of Action on DNA Damage In Vitro.” *PLOS One*. Vol. 9 Issue 8. (August 2014).
- Fasching, Peter A., Simon Gayther, Leigh Pearce, Joellen M. Schildkraut, Ellen Goode, Falk Thiel, Georgia Chenevix-Trench, et al. “Role of Genetic Polymorphisms and Ovarian Cancer Susceptibility.” *Molecular Oncology* 3, no. 2 (April 2009): 171–81. <https://doi.org/10.1016/j.molonc.2009.01.008>.
- Fathalla, M. F. “Incessant Ovulation – A Factor in Ovarian Neoplasia.” *The Lancet* (July 1971): 163.
- FDA. “Ltr to Samuel S. Epstein, M.D., RE: Docket Numbers 94P-0420 and FDA-2008-P-0309-0001 /CP,” April 1, 2017.
- FDA. “Talc.” <https://www.fda.gov/Cosmetics/ProductsIngredients/Ingredients/ucm293184.htm>
- Federal Register 37, “Subpart G-Occupational Health and Environmental Control.” No. 202 (October 18, 1972): 22139-144.
- Federal Register 40 CFR Part 763, “Part III – Environmental Protection Agency: Asbestos-Containing Materials in Schools; Final Rule and Notice.” Vol. 52, No. 210 (October 30, 1987): 41826-41906.
- Fernandes, José Veríssimo, Ricardo Ney Oliveira Cobucci, Carlos André Nunes Jatobá, Thales Allyrio Araújo de Medeiros Fernandes, Judson Welber Veríssimo de Azevedo, and Josélio Maria Galvão de Araújo. “The Role of the Mediators of Inflammation in Cancer Development.” *Pathology & Oncology Research* 21, no. 3 (July 2015): 527–34. <https://doi.org/10.1007/s12253-015-9913-z>.
- Ferrante, Daniela, Marinella Bertolotti, Annalisa Todesco, Dario Mirabelli, Benedetto Terracini, and Corrado Magnani. “Cancer Mortality and Incidence of Mesothelioma in a Cohort of Wives of Asbestos Workers in Casale Monferrato, Italy.” *Environmental Health Perspectives* 115, No. 10 (October 2007).
- Ferrer, Jaume, Juan F. Montes, Maria A. Villarino, Richard W. Light, and José García-Valero. “Influence of Particle Size on Extrapleural Talc Dissemination After Talc Slurry Pleurodesis.” *Chest* 122, No. 3 (September 2002): 1018–27.
- Finley, Brent L., Jennifer S. Pierce. “Evaluation of tremolite asbestos exposures associated with the use of commercial products.” *Critical Reviews in Toxicology*. No. 42(2) (2012): 119–146
- Finnish Institute of Occupational Health. *Asbestos, Asbestosis, and Cancer, Helsinki Criteria for Diagnosis and Attribution 2014*. (June 2014).
- Fiume, Monice M., Ivan Boyer, Wilma F. Bergfeld et al. “Safety Assessment of Talc as Used in Cosmetics.” *International Journal of Toxicology* Vol. 34, No. 1 (2015): 66-129.
- Fletcher, Nicole, Jimmy Belotte, et al. “Specific point mutations in key redox enzymes are associated with chemoresistance in epithelial ovarian cancer.” *Free Radical Biology and*

- Medicine*. 102 (2017) 122–132.
- Fletcher, Nicole M., Zhongliang Jiang, Rouba Ali-Fehmi, Nancy K. Levin, Jimmy Belotte, Michael A. Tainsky, Michael P. Diamond, Husam M. Abu-Soud, and Ghassan M. Saed. “Myeloperoxidase and Free Iron Levels: Potential Biomarkers for Early Detection and Prognosis of Ovarian Cancer.” *Cancer Biomarkers* 10 (2012 2011): 267–75.
<https://doi.org/10.3233/CBM-2012-0255>.
- Fleming, Jean S., Clare R. Beaugié, Izhak Haviv, Georgia Chenevix-Trench, and Olivia L. Tan. “Incessant Ovulation, Inflammation and Epithelial Ovarian Carcinogenesis: Revisiting Old Hypotheses.” *Molecular and Cellular Endocrinology* 247, No. 1–2 (March 2006): 4–21.
- Fletcher, Nicole, Ira Memaj, and Ghassan M Saed. “Talcum Powder Enhances Oxidative Stress in Ovarian Cancer Cells.” *Reproductive Sciences* 25, Supplement 1 (March 2018): 214A-215A.
- Forman, Henry Jay and Martine Torres. “Reactive Oxygen Species and Cell Signaling Respiratory Burst in Macrophage Signaling.” *Am J Respir Crit Care Med*. Vol 166. (2002) pp S4–S8.
- Frank, Czul, Lascano Jorge. “An uncommon hazard: Pulmonary talcosis as a result of recurrent aspiration of baby powder.” *Respiratory Medicine CME* 4, (2011): 109-111.
- Freedman, Ralph S, Michael Deavers, Jinsong Liu, and Ena Wang. “Peritoneal Inflammation – A Microenvironment for Epithelial Ovarian Cancer (EOC).” *Journal of Translational Medicine* 2, no. 23 (2004). <https://doi.org/10.1186/1479-5876-2-23>.
- Friebel, Tara M., Susan M. Domchek, and Timothy R. Rebbeck. “Modifiers of Cancer Risk in BRCA1 and BRCA2 Mutation Carriers: Systematic Review and Meta-Analysis.” *Journal of the National Cancer Institute* 106, no. 6 (June 2014): dju091.
<https://doi.org/10.1093/jnci/dju091>.
- Friedrichs, Karl Heinz. “Electron Microscopic Analyses of Dust From the Lungs and the Lymph Nodes of Talc-Mine Employees.” *American Industrial Hygiene Association Journal* 48, No. 7 (July 1987): 626–33.
- Galea, Sandro and Roger Vaughan. “Moving Beyond the Cause of Constraint: A Public Health of Consequence.” *American Journal of Public Health* 108, No. 5 (May 2018): 602-03.
- Gamble, John F., William Fllner and Michal J. Dimeo. “An Epidemiologic Sutdy of a Group of Talc Workers.” *American Review of Respiratory Disease*. Vol. 119 (1979): 741-753.
- Gardner, M.J., P.D. Winter, B. Pannett, and C.A. Powell. “Follow Up Study of Workers Manufacturing Chrysotile Asbestos Cement Products.” *British Journal of Industrial Medicine* 43, (1986): 726-32.
- Gates, M. A., B. A. Rosner, J. L. Hecht, and S. S. Tworoger. “Risk Factors for Epithelial Ovarian Cancer by Histologic Subtype.” *Am J Epidemiol* 171, No. 1 (2010): 45–53.
- Gates, M. A., S. S. Tworoger, K. L. Terry, L. Titus-Ernstoff, B. Rosner, I. De Vivo, D. W. Cramer, and S. E. Hankinson. “Talc Use, Variants of the GSTM1, GSTT1, and NAT2 Genes, and Risk of Epithelial Ovarian Cancer.” *Cancer Epidemiol Biomarkers Prev*. 17, No. 9 (September 2008): 2436–44.
- Gavalas, Nikos G, Alexandra Karadimou, et al. “Immune Response in Ovarian Cancer: How Is the Immune System Involved in Prognosis and Therapy: Potential for Treatment Utilization. *Clinical and Developmental Immunology*. Vol. 2010. Article ID 791603.
- Genofre, Eduardo H., Francisco S. Vargas, Milena M.P. Acencio, Leila Antonangelo, Lisete R. Teixeira, and Evaldo Marchi. “Talc Pleurodesis: Evidence of Systemic Inflammatory

- Response to Small Size Talc Particles.” *Respiratory Medicine* 103, No. 1 (2009): 91–97.
- Germani, D., S. Belli, C. Bruno, M. Grignoli, M. Nesti, R. Pirastu, and P. Comba. “Cohort Mortality Study of Women Compensated for Asbestosis in Italy.” *Am. J. Ind. Med.* 36, No. 1 (1999): 129–34.
- Gertig, Dorota M., David J. Hunter, Daniel W. Cramer, Graham A. Colditz, Frank E. Speizer, Walter C. Willett, and Susan E. Hankinson. “Prospective Study of Talc Use and Ovarian Cancer.” *J Natl Cancer Inst* 92, No. 3 (2000): 249–52.
- Getze, George. “Asbestos Blamed for Increase in Ovary Cancer.” *The Philadelphia Inquirer* (March 28, 1968).
- Ghio, Andrew J. and Victor Roggli. “Letter to the Editor: Talc Should Not Be Used for Pleurodesis in Patients with Nonmalignant Pleural Effusions.” *American Journal of Respiratory Critical Care Medicine* (2001): 1741.
- Ghio, Andrew J., Joleen M. Soukup, Lisa A. Dailey, Judy H. Richards, Jennifer L. Turi, Elizabeth N. Pavlisko, and Victor L. Roggli. “Disruption of Iron Homeostasis in Mesothelial Cells after Talc Pleurodesis.” *Am J Respir Cell Mol Biol* 46, No. 1 (January 2012): 80–86.
- Ghio, Andrew J., Joleen M. Soukup, Lisa A. Dailey, Judy Richards, Zhongping Deng, Jerrold L. Abraham. “Gadolinium exposure disrupts iron homeostasis in cultured cells.” *J Biol Inorg Chem.* No. 16 (2011): 567–575.
- Gilbert, Christopher, Benjamin R. Furman, et al. “Description of Particle Size, Distribution, and Behavior of Talc Preparations Commercially Available Within the United States.” *J Bronchol Intervent Pulmonol.* Vol. 25, No. 1. (January 2018).
- “Global Ban on the Mining and Use of Asbestos.” *World Federation of Public Associations.* (2005).
- Godard, Beatrice, William D. Foulkes, Diane Provencher, Jean-Sebastien Brunet, Patricia N. Tonin, Anne-Marie Mes-Masson, Steven A. Narod, and Parviz Ghadirian. “Risk Factors for Familial and Sporadic Ovarian Cancer among French Canadians: A Case-Control Study.” *Am J Obstet Gynecol* 179, No. 2 (August 1998): 403–10.
- Gondal, Mohammed A., Mohamed A. Dastageer, Akhtar A. Naqvi, Anvar A. Isab, Yasin W. Maganda. “Detection of toxic metals (lead and chromium) in talcum powder using laser induced breakdown spectroscopy.” *Applied Optics* Vol. 51, No. 30 (October 2012): 7395-7401.
- Gonzalez, N.L., K.M. O’Brien, A.A. D’Aloisio, D.P. Sandler, and C.R. Weinberg. “Douching, Talc Use, and Risk of Ovarian Cancer.” *Epidemiology* 27, No. 6 (November 2016): 797–802.
- Gordon, Ronald E., Sean Fitzgerald, and James Millette. “Asbestos in Commercial Cosmetic Talcum Powder as a Cause of Mesothelioma in Women.” *International Journal of Occupational and Environmental Health* 20, No. 4 (October 2014): 318–32.
- Graham, and Jenkins. “Value of Modified Starch as a Substitute for Talc.” *Lancet (London, England)* 1, no. 6708 (March 22, 1952): 590–91.
- Graham, John, and Ruth Graham. “Ovarian Cancer and Asbestos.” *Environmental Research* 1, No. 2 (October 1967): 115–28.
- Green, Adèle, David Purdie, Christopher Bain, Victor Siskind, Peter Russell, Michael Quinn, and Bruce Ward. “Tubal Sterilisation, Hysterectomy and Decreased Risk of Ovarian Cancer.” *Int. J. Cancer* 71, No. 6 (June 11, 1997): 948–51.
- Grivennikov, Sergei I., Florian R. Greten, and Michael Karin. “Immunity, Inflammation, and

- Cancer.” *Cell* 140, no. 6 (March 19, 2010): 883–99.
<https://doi.org/10.1016/j.cell.2010.01.025>.
- Gross, Alan J., and Paul H. Berg. “A Meta-Analytical Approach Examining the Potential Relationship Between Talc Exposure and Ovarian Cancer.” *Journal of Exposure Analysis and Environmental Epidemiology* 5, No. 2 (1995): 181-195.
- Halme, J., M. G. Hammond, J. F. Hulka, S. G. Raj, and L. M. Talbert. “Retrograde Menstruation in Healthy Women and in Patients with Endometriosis.” *Obstetrics and Gynecology* 64, no. 2 (August 1984): 151–54.
- Hammar, S.P., R.F. Dodson. “Asbestos: Risk Assessment, Epidemiology, and Health Effects, Second Edition.” 2nd Edition, Ch. 28 (2017): 927-930; 976.
- Hamilton, John A., Geraldine McCarthy and Genevieve Whitty. “Primary research Inflammatory microcrystals induce murine macrophage survival and DNA synthesis.” *Arthritis Res No. 3* (2001): 242–246.
- Hamilton, T.C., H. Fox, C.H. Buckley, W.J. Henderson’, W J, and K Griffiths. “Effects of Talc on the Rat Ovary.” *Br. J. Exp. Path.* 65, (1984): 101-106.
- Hammar, S.P. and R.F. Dodson. *Asbestos: Risk Assessment, Epidemiology, and Health Effects*.
- Harding, A.H., A. Darnton, J. Wegerdt, and D. McElvenny. “Mortality Among British Asbestos Workers Undergoing Regular Medical Examinations.” *Occupational and Environmental Medicine* 66, (2009): 487-95.
- Harlow, Bernard L., and Noel S. Weiss. “A Case-Control Study of Borderline Ovarian Tumors: The Influence of Perineal Exposure to Talc.” *American Journal of Epidemiology* 130, No. 2 (August 1989): 390–94.
- Harlow, Bernard L., Daniel W. Cramer, Debra A. Bell and William R. Welch. “Perineal Exposure to Talc and Ovarian Cancer Risk.” *Obstet Gynecol* 80, No. 1 (July 1992): 19-26.
- Hartge, Patricia, Robert Hoover, Linda P. Leshner, and Larry McGowan. “Talc and Ovarian Cancer.” *JAMA* 250, No. 14 (October 14, 1983): 1844.
- Heidland, A., Klassen A., Rutkowski, P., Bahner, U. The contribution of Rudolf Virchow to the concept of inflammation: what is still of importance? *Journal of nephrology*. 2006; 29(Suppl 10): S102-109.
- Hein, Misty J., Leslie T. Stayner, Everett Lehman, John M. Dement. “Follow-Up Study of Chrysotile Textile Workers: Cohort Mortality and Exposure-Response.” *Occupational and Environmental Medicine* 64, (2007): 616-25.
- Henderson, W.J., C.A.F. Joslin, A.C. Turnbull. “Talc and Carcinoma of the Ovary and Cervix.” *The Journal of Obstetrics and Gynaecology of the British Commonwealth* Vol. 78 (March 1971): 266-272.
- Henderson, W.J., A.V. Maskell, K Griffiths. “Contamination of Surgical Gloves.” *British Medical Journal*, (February 1978): 363.
- Henderson, W.J., T.C. Hamilton, M.S. Baylis, C.G. Pierrepont, K. Griffiths. “The Demonstration of the Migration of Talc from the Vagina and Posterior Uterus to the Ovary in the Rat.” *Environmental Research* 40 (1986): 247-250.
- Heller, Debra S., Ronald E. Gordon, and Norman Katz. “Correlation of Asbestos Fiber Burdens in Fallopian Tubes and Ovarian Tissue.” *Am J Obstet Gynecol* 181, No. 2 (August 1999): 346–47.
- Heller, Debra S., Ronald E. Gordon, Carolyn Westhoff, and Susan Gerber. “Asbestos Exposure and Ovarian Fiber Burden.” *American Journal of Industrial Medicine* 29, No. 5 (May

- 1996): 435–39.
- Heller, D. S., C. Westhoff, R. E. Gordon, and N. Katz. “The Relationship between Perineal Cosmetic Talc Usage and Ovarian Talc Particle Burden.” *American Journal of Obstetrics and Gynecology* 174, no. 5 (May 1996): 1507–10.
- Hernán, Miguel A. “The C-Word: Scientific Euphemisms Do Not Improve Causal Inference From Observational Data.” *Am J Public Health* 108, No. 5 (May 2018): 616–19.
- Hildick-Smith, Gavin Y. “The Biology of Talc.” *British Journal of Industrial Medicine* 33, (1976): 217-229.
- Hill, Austin Bradford. “The Environment and Disease: Association or Causation?” *Proceedings of the Royal Society of Medicine* 58, no. 5 (May 1965): 295–300.
- Hillegass, Jedd M., Arti Shukla, Maximilian B. MacPherson, Jeffrey P. Bond, Chad Steele, and Brooke T. Mossman. “Utilization of Gene Profiling and Proteomics to Determine Mineral Pathogenicity in a Human Mesothelial Cell Line (LP9/TERT-1).” *Journal of Toxicology and Environmental Health. Part A* 73, no. 5 (January 2010): 423–36. Hoffeld, J. Terrell. “Inhibition of Lymphocyte Proliferation and Antibody Production in Vitro by Silica, Talc, Bentonite Or Corynebacterium Parvum: Involvement of Peroxidative Processes.” *Eur. J. Immunol* 13, No. 5 (1983): 364–69.
- Hollinger, Manfred A. “Pulmonary toxicity of inhaled and intravenous talc.” *Elsevier: Toxicology Letters* 52 (1990): 121-127.
- Holschneider, Christine H., and Jonathan S. Berek. “Ovarian Cancer: Epidemiology, Biology, and Prognostic Factors.” *Semin. Surg. Oncol.* 19, No. 1 (July 2000): 3–10.
- Honda, Yasushi, Colleen Beall, Elizabeth Delzell, Kent Oestensad, Ilene Brill and Robert Matthews. “Mortality among Workers at a Talc Mining and Milling Facility.” *The Annals of Occupational Hygiene* 46, No. 7 (October 2002): 575-85.
- Houghton, S. C., K. W. Reeves, S. E. Hankinson, L. Crawford, D. Lane, J. Wactawski-Wende, C. A. Thomson, J. K. Ockene, and S. R. Sturgeon. “Perineal Powder Use and Risk of Ovarian Cancer.” *JNCI J Natl Cancer Inst* 106, No. 9 (September 10, 2014).
- Huncharek, Michael, J.F. Geschwind and Bruce Kupelnick. “Perineal Application of Cosmetic Talc and Risk of Invasive Epithelial Ovarian Cancer: A Meta-Analysis of 11,933 Subjects from Sixteen Observational Studies.” *Anticancer Research* 25, (2003): 1955-1960.
- Huncharek, Michael, and Joshua Muscat. “Perineal Talc Use and Ovarian Cancer Risk: A Case Study of Scientific Standards in Environmental Epidemiology.” *European Journal of Cancer Prevention* 20, No. 6 (November 2011): 501–7.
- Huncharek, Michael, Joshua Muscat, Adedayo Onitilo, and Bruce Kupelnick. “Use of Cosmetic Talc on Contraceptive Diaphragms and Risk of Ovarian Cancer: A Meta-Analysis of Nine Observational Studies.” *European Journal of Cancer Prevention* 16, No. 5 (October 2007): 422–29.
- Hunn, Jessica, Gustavo C. Rodriguez. “Ovarian Cancer: Etiology, Risk Factors, and Epidemiology” *Clinical Obstetrics and Gynecology* Vol. 55, No. 1: 3-23.
- “Inflammation: A Hidden Path to Breaking the Spell of Ovarian Cancer.” *Cell Cycle* 8, no. 19 (2009): 3107–11.
- Institute of Medicine (US) Committee on Asbestos: Selected Health Effects. *Asbestos: Selected Cancers*. The National Academies Collection: Reports Funded by National Institutes of Health. Washington (DC): National Academies Press (US), 2006.
<http://www.ncbi.nlm.nih.gov/books/NBK20332/>.

- International Agency for Research on Cancer (IARC), "Some Inorganic and Organometallic Compounds", IARC Monograph No. 2 (1973).
- International Agency for Research on Cancer (IARC), "IARC Monographs On The Evaluation Of Carcinogenic Risk Of Chemicals To Man: Cadmium, Nickel, Some Epoxides, Miscellaneous Industrial Chemicals and General Considerations on Volatile Anaesthetics." IARC Monograph Vol. 11 (1976): 1-282.
- International Agency for Research on Cancer (IARC), "Asbestos", IARC Monograph No. 14 (1977).
- International Agency for Research on Cancer (IARC), "IARC Monographs On The Evaluation Of The Carcinogenic Risks To Humans: Chemicals and Industrial Processes Associated with Cancer in Humans." IARC Monographs, Volumes 1 to 20 Supplement 1 (1979).
- International Agency for Research on Cancer (IARC), "IARC Monographs On The Evaluation Of The Carcinogenic Risks To Humans: Chemicals, Industrial Processes and Industries Associated With Cancer in Humans." IARC Monographs, Volumes 1 to 29 Supplement 4 (1982).
- International Agency for Research on Cancer (IARC), "Carbon Black, Titanium Dioxide, and Talc." IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, v. 93. Lyon, France : Geneva: International Agency for Research on Cancer ; Distributed by WHO Press, 2010.
- International Agency for Research on Cancer (IARC), "Overall Evaluation of Carcinogenicity: An Updating of IARC Monographs Volumes 1 to 42 Supplement 7 (1987).
- International Agency for Research on Cancer (IARC), "Silica and Some Silicates", IARC Monograph No. 42 (1987).
- International Agency for Research on Cancer (IARC), "Mechanisms of Fibre Carcinogenesis", IARC Scientific Publications No. 140 (1996).
- International Agency for Research on Cancer (IARC), "Silica, Some Silicates, Coal Dust and Para-Aramid Fibrils", IARC Monograph No. 68 (1997).
- International Agency for Research on Cancer (IARC), "A review of human carcinogens-Part C: metals, arsenic, dusts and fibres." *The Lancet* 10 (2009): 453-454.
- International Agency for Research on Cancer (IARC), "Carbon Black, Titanium Dioxide, and Talc", IARC Monographs No. 93., (2010).
- International Agency for Research on Cancer (IARC), "Arsenic, Metals, Fibres, and Dusts," IARC Monograph No. 100C (2012).
- International Agency for Research on Cancer (IARC), "Table 2.8. Epidemiologic studies of asbestos exposure and ovarian cancer." 1-3.
- International Labour Organization (ILO), "Resolution concerning asbestos, 2006." *ILO Resolution* (June 2006): 1-2.
- Ingersoll, Molly A., Andrew M. Platt, Stephane Potteaux, Gwendalyn J. Randolph. "Monocyte trafficking in acute and chronic inflammation." *Trends Immunol.* 32, No. 10 (October 2011): 470-477.
- Iturralde, Mario, Pieter Ferdinand Venter. "Hysterosalpingo-Radionuclide Scintigraphy (HERS)." *Seminars in Nuclear Medicine* Vol. XI, No. 4 (October 1981): 301-314.
- Jammal, Millena Prata, Agrinaldo Martins-Filho, et al., "Cytokines and Prognostic Factors in Epithelial Ovarian Cancer." *Clinical Medicine Insights: Oncology* 10 (2016): 71-76.
- Jampol, Lee M., Tomoichi Setogawa, Krishna Rao V. Rednam, Mark O.M Tso. "Talc Retinopathy in Primates." *Archives of Ophthalmology* 99, (July 1981): 1273-80.

- Jarad, N Al, M Macey, S Uthayakumar, A C Newland, and R M Rudd. "Lymphocyte Subsets in Subjects Exposed to Asbestos: Changes in Circulating Natural Killer Cells." *British Journal of Industrial Medicine* 49, (1992): 811-814.
- Jasuja, Sonia, Brooks T. Kuhn, Michael Schivo, Jason Y. Adams. "Cosmetic Talc-Related Pulmonary Granulomatosis." *Journal of Investigative Medicine High Impact Case Reports* Vol. 1, No. 4 (2017): 1-4.
- Jervis, Sarah, Honglin Song, Andrew Lee, Ed Dicks, Jonathan Tyrer, Patricia Harrington, Douglas F. Easton, Ian J. Jacobs, Paul P. D. Pharoah, and Antonis C. Antoniou. "Ovarian Cancer Familial Relative Risks by Tumour Subtypes and by Known Ovarian Cancer Genetic Susceptibility Variants." *Journal of Medical Genetics* 51, no. 2 (February 2014): 108–13. <https://doi.org/10.1136/jmedgenet-2013-102015>.
- Jia, D, Y Nagaoka, S Orsulic, and M Katsumata. "Inflammation Is a Key Contributor to Ovarian Cancer Cell Seeding." *Scientific Reports* 8, no. 12394 (August 17, 2018). <https://doi.org/10.1038/s41598-018-30261-8>.
- Jiang, Zhongliang, Nicole M. Fletcher, Rouba Ali-Fehmi, Michael P. Diamond, Husam M. Abu-Soud, Adnan R. Munkarah, and Ghassan M. Saed. "Modulation of Redox Signaling Promotes Apoptosis in Epithelial Ovarian Cancer Cells." *Gynecologic Oncology* 122, no. 2 (August 2011): 418–23. <https://doi.org/10.1016/j.ygyno.2011.04.051>.
- Jing, Jiongjie, Xiaolong Jiang, Jianwei Chen, Xiaolei Yao et al. "Notch signaling pathway promotes the development of ovine ovarian follicular granulosa cells." *Animal Reproduction Science* 181 (2017): 69-78.
- Jing, Xuquan, Feng Li, Xue Meng, Zhitong Liu, Jinming Yu, Bo Liu. "Ovarian metastasis from lung adenocarcinoma with ALK-positive rearrangement detected by next generation sequencing: A case report and literatures review." *Cancer Biology & Therapy* Vol. 18, No. 5 (2017): 279-284.
- Jo, Hwanju, Young Nam Jang and Jung Hyun Jo. "A Low Temperature Detoxification Method for Treatment of Chrysotile-Containing Waste Roofing Slate." *Minerals* 7, No. 144 (2017).
- Jones, Richard E., and Kristin H. Lopez. "Human Reproductive Biology - 4th Edition Chapter 9 - Gamete Transport and Fertilization." In *Human Reproductive Biology*, Third., 159–73. San Diego: Academic Press, 2006. <https://doi.org/10.1016/B978-0-12-382184-3.00009-X>.
- Jordan, Susan J., Adèle C. Green, David C. Whiteman, and Penelope M. Webb. "Risk Factors for Benign Serous and Mucinous Epithelial Ovarian Tumors." *Obstetrics & Gynecology* 109, No. 3 (March 2007): 647–54.
- Jurinski, Joseph B., and J. Donald Rimstidt. "Biodurability of Talc." *American Mineralogist* 86, No. 4 (April 2001): 392–99.
- Kane, AB, P Boffetta, R Saracci, and JD Wilbourn. "Mechanisms of Fibre Carcinogenesis." IARC, 1996.
- Kang, N., D. Griffin, and H. Ellis. "The Pathological Effects of Glove and Condom Dusting Powders." *Journal of Applied Toxicology* 12, No. 6 (December 1992): 443–49.
- Karageorgi, S., M. A. Gates, S. E. Hankinson, and I. De Vivo. "Perineal Use of Talcum Powder and Endometrial Cancer Risk." *Cancer Epidemiology Biomarkers & Prevention* 19, No. 5 (May 2010): 1269–75.
- Kauff, Noah D., Nandita Mitra, Mark E. Robson, Karen E. Hurley, Shaokun Chuai, Deborah Goldfrank, Eve Wadsworth, et al. "Risk of Ovarian Cancer in BRCA1 and BRCA2

- Mutation-Negative Hereditary Breast Cancer Families.” *Journal of the National Cancer Institute* 97, no. 18 (September 21, 2005): 1382–84. <https://doi.org/10.1093/jnci/dji281>.
- Keal, E E. “Asbestosis and Abdominal Neoplasms.” *The Lancet* (December 3, 1960): 1211-16.
- Kerger, Brent D., Robert C. James and David A. Galbraith. “Tumors that Mimic Asbestos-Related Mesothelioma: Time to Consider a Genetics-Based Tumor Registry.” *Frontiers in Genetics* 5, No. 151 (May 30, 2014): 1-14.
- Keskın, Nadi, Yasemin Aktan Teksen, Esra Gürlek Ongun, Yusuf Özay, and Halil Saygılı. “Does Long-Term Talc Exposure Have a Carcinogenic Effect on the Female Genital System of Rats? An Experimental Pilot Study.” *Archives of Gynecology and Obstetrics* 280, No. 6 (December 2009): 925–31.
- Khan, Mohd Imran, Amogh A. Sahasrabuddhe, Govil Patil, Mohd Javed Akhtar, Mohd Ashquin, and Iqbal Ahmad. “Nano-Talc Stabilizes TNF- α m-RNA in Human Macrophages.” *Journal of Biomedical Nanotechnology* 7, No. 1 (January 2011): 112–13.
- Kim, Brian, Francis M. Giardiello. “Chemoprevention in familial adenomatous polyposis.” *Best Pract Res Clin Gastroenterol* Vol. 25, No. 0 (August 2011): 607-622.
- Kiraly, Orsolya, Guanyu Gong, Werner Olipitz, Sureshkumar Muthupalani, and Bevin P. Engelward. “Inflammation-Induced Cell Proliferation Potentiates DNA Damage-Induced Mutations In Vivo.” *PLoS Genetics*, February 3, 2015. <https://doi.org/10.1371/journal.pgen.1004901>.
- Kissler, Stefan, Ernst Siebzehnuebl, Joachim Kohl, Anja Mueller, Nadja Hamscho, Regine Gaetje, Andre Ahr, Achim Rody, and Manfred Kaufmann. “Uterine Contractility and Directed Sperm Transport Assessed by Hysterosalpingoscintigraphy (HSSG) and Intrauterine Pressure (IUP) Measurement.” *Acta Obstetricia Et Gynecologica Scandinavica* 83, no. 4 (April 2004): 369–74.
- Kleinfeld, M., J. Messite, Olive Kooyman, Mahfouz H. Zaki. “Mortality Among Talc Miners and Millers in New York State.” *Archives of Environmental Health: An International Journal* Vol. 14, No. 5 (1967): 663-667.
- Kleinfeld, M., J. Messite, M. H. Zaki. “Mortality Experiences Among Talc Workers: A Follow-up Study.” *Journal of Occupational Medicine* Vol. 16, No. 5 (May 1974): 345-349.
- Kreyling, W.G., Semmler-Behnke, M.S., Moller, W. Ultrafine particle-lung interaction: Does size matter? *Journal of Aerosol Medicine*. 2006. 19(1).
- Kunz, G., D. Beil, H. Deiniger, A. Einspanier, G. Mall, and G. Leyendecker. “The Uterine Peristaltic Pump. Normal and Impeded Sperm Transport within the Female Genital Tract.” *Advances in Experimental Medicine and Biology* 424 (1997): 267–77.
- Kurta, M. L., K. B. Moysich, J. L. Weissfeld, A. O. Youk, C. H. Bunker, R. P. Edwards, F. Modugno, R. B. Ness, and B. Diergaarde. “Use of Fertility Drugs and Risk of Ovarian Cancer: Results from a US-Based Case-Control Study.” *Cancer Epidemiology Biomarkers & Prevention* 21, No. 8 (August 2012): 1282–92.
- La Vecchia, Carlo. “Ovarian Cancer: Epidemiology and Risk Factors.” *European Journal of Cancer Prevention* 26, No. 1 (January 2017): 55–62.
- Landen, Charles N., Michael J. Birrer, and Anil K. Sood. “Early Events in the Pathogenesis of Epithelial Ovarian Cancer.” *Journal of Clinical Oncology: Official Journal of the American Society of Clinical Oncology* 26, no. 6 (February 20, 2008): 995–1005.
- Lane, D., Matte, I., Rancourt, C., Piche, A. Prognostic significance of IL-6 and IL-8 ascites levels in ovarian cancer patients. *BMC Cancer*. 2011. 11:210.

- Lane, Denis, Veronique Robert et al. "Malignant ascites protect against TRAIL-induced apoptosis by activating the PI3K/Akt pathway in human ovarian carcinoma cells." *Int. J. Cancer* 121 (2007): 1227-1237.
- Langseth, H, S E Hankinson, J Siemiatycki, and E Weiderpass. "Perineal Use of Talc and Risk of Ovarian Cancer." *Journal of Epidemiology & Community Health* 62, No. 4 (April 2008): 358-60.
- Langseth, H., B.V. Johansen, J.M. Nesland, and K. Kjaerheim. "Asbestos Fibers in Ovarian Tissue from Norwegian Pulp and Paper Workers." *International Journal of Gynecological Cancer* 17, No. 1 (January 2007): 44-49.
- Langseth, Hilde, and Kristina Kjærheim. "Ovarian Cancer and Occupational Exposure Among Pulp and Paper Employees in Norway." *Scandinavian Journal of Work, Environment & Health* 30, No. 5 (October 2004): 356-61.
- Lee, Jennifer S., Esther M. John, Valerie McGuire, Anna Felberg, Kimberly L. Ostrow, Richard A. DiCioccio, Frederick P. Li, Alexander Miron, Dee W. West, and Alice S. Whittemore. "Breast and Ovarian Cancer in Relatives of Cancer Patients, with and without BRCA Mutations." *Cancer Epidemiology, Biomarkers & Prevention: A Publication of the American Association for Cancer Research, Cosponsored by the American Society of Preventive Oncology* 15, no. 2 (February 2006): 359-63.
<https://doi.org/10.1158/1055-9965.EPI-05-0687>.
- Lee, Richard, and Drew Van Orden. "Asbestos in Commercial Cosmetic Talcum Powder as a Cause of Mesothelioma in Women." *International Journal of Occupational and Environmental Health* 21, No. 4 (October 2, 2015): 337-41.
- Lee, Sang Hee, and Roy J. Richards. "Montserrat Volcanic Ash Induces Lymph Node Granuloma and Delayed Lung Inflammation." *Toxicology* 195, No. 2-3 (February 2004): 155-65.
- Li, Jing, Xuedan Jiao, Zhongfu Yuan, Haifeng Qiu, Ruixia Guo. "C-reactive protein and risk of ovarian cancer A systematic review and meta-analysis." *Medicine* Vol. 96, No. 34 (2017): 1-7.
- Li, Yong-Jian, Kai Yao, Min-Xun Lu, Wen-Biao Zhang, Cong Xiao, Chong-Qi Tu. "Prognostic value of the C-reactive protein to albumin ratio: a novel inflammation-based prognostic indication in osteosarcoma." *OncoTargets and Therapy* 10 (2017): 5255-5261.
- Liou, Geou-Yarh, and Peter Storz. "Reactive Oxygen Species in Cancer." *Free Radical Research* 44, no. 5 (May 2010): 476-96.
- Lison, D., Boeck, M.D., Kirsch-Volders, M. Update on the genotoxicity and carcinogenicity of cobalt compounds. *Occup Environ Med* 2001. Oct; 58(10):619-25.
- Liu, D. T., and A. Hitchcock. "Endometriosis: Its Association with Retrograde Menstruation, Dysmenorrhoea and Tubal Pathology." *British Journal of Obstetrics and Gynaecology* 93, no. 8 (August 1986): 859-62.
- Lengyel, Ernst. "Ovarian Cancer Development and Metastasis." *The American Journal of Pathology* Vol. 177, No. 3 (September 2010): 1053-1064.
- Lockey, James E. "Nonasbestos Fibrous Minerals." *Clinics in Chest Medicine* Vol. 2, No. 2 (May 1981): 203-218.
- Longo, D.L. and R.C. Young. Aug 1979 - "Cosmetic Talc and Ovarian Cancer." *The Lancet* (August 18, 1979): 349-351.
- Longo, D.L. and R.C. Young. Nov 1979 - "Cosmetic Talc and Ovarian Cancer." *The Lancet* (November 10, 1979): 1011-1012.

- Longo, William E., Mark W. Rigler, and William B. Egeland. "Below the Waist Application of Johnson & Johnson Baby Powder." Materials Analytical Service, LLC, September 2017.
- Longo, William E., and Mark W. Rigler. "The Analysis of Johnson & Johnson's Historical Baby Powder & Shower to Shower Products from the 1960's to the Early 1990's for Amphibole Asbestos," November 14, 2018.
- Loomis, D., J.M. Dement, S.H. Wolf, and D.B. Richardson. "Lung Cancer Mortality and Fibre Exposures Among North Carolina Asbestos Textile Workers." *Occupational and Environmental Medicine* 66, (2009): 535-542.
- Lopez-Galindo, A, C. Viseras, and P. Cerezo. "Compositional, Technical and Safety Specifications of Clays to Be Used as Pharmaceutical and Cosmetic Products." *Applied Clay Science* 36, No. 1-3 (April 2007): 51-63.
- Lord, G.H. "The Biological Effects of Talc in the Experimental Animal: A Literature Review." *Food and Cosmetics Toxicology* 16, No. 1 (February 1978): 51-57.
- Low, L.C.K., J. Lang, and W.D. Alexander. "Excretion of Carbimazole and Propylthiouracil in Breast Milk." *The Lancet* 314, No. 8150 (November 10, 1979): 1011.
- Lu, Hsiao-Mei, Shuwei Li, Mary H. Black et al. "Association of Breast and Ovarian Cancers With Predisposition Genes Identified by Large-Scale Sequencing." *JAMA Oncology* (August 16, 2018): E1-E8.
- Maccio, A., and Madeddu, C. (2012). Inflammation and ovarian cancer. *Cytokine* 58, 133-147.
- Magnani, C, D Ferrante, F Barone-Adesi, M Bertolotti, A Todesco, D Mirabelli, and B Terracini. "Cancer Risk after Cessation of Asbestos Exposure: A Cohort Study of Italian Asbestos Cement Workers." *Occupational and Environmental Medicine* 65, No. 3 (2007): 164-70.
- Mahmood, Samiya. "A Comparative Situation Analysis on Pre-Cancerous Lesions among Slum and Brothel Dwelling Women and Average Housewives Who Fall within the Reproductive Age Group and Living in Bangladesh." *Gynecology & Obstetrics* 07, No. 09 (2017).
- Mäki-Nevala, Satu, Virinder Kaur Sarhadi, Aija Knuuttila, Ilari Scheinin, Pekka Ellonen, Sonja Lagström, Mikko Rönty, et al. "Driver Gene and Novel Mutations in Asbestos-Exposed Lung Adenocarcinoma and Malignant Mesothelioma Detected by Exome Sequencing." *Lung* 194, no. 1 (February 2016): 125-35.
<https://doi.org/10.1007/s00408-015-9814-7>.
- Mamo, Carlo and Giuseppe Costa. "Mortality Experience in an Historical Cohort of Chrysotile Asbestos Textile Workers." (2004).
- Marconi, A., U. Verdel. "Asbestos content of talcs from Italian mines and fibre concentration in various commercial talcum powders used in Italy." *Health Related Effects of Phyllosilicates* Vol. G 21 (1990): 107-115.
- Mariani-Costantini, Renato, Frank S. Jannotta, and Frank B. Johnson. "Systemic Visceral Talc Granulomatosis Associated with Miliary Tuberculosis in a Drug Addict." *American Journal of Clinical Pathology* 78, No. 5 (November 1982): 785-89.
- Mariani, F., Sena, P., Roncucci, L. Inflammatory pathways in the early steps of colorectal cancer development. *World J Gastroenterol.* 2014. August 7; 20(29):9716-9731.
- Mattenklott, M. "Asbest in Talkumpudern und Speckstein – heutige Situation." *Gefahrstoffe – Reinhaltung der Luft* Vol. 67, No. 7/8 (2007): 287-292.
- McCarthy, Edward F., Noel A. Genco, Ernest H. Reade Jr. "Talc." 7th Edition (2006): 1-16.
- McCluggage, W. G., D.C. Allen. "Ovarian granulomas: a report of 32 cases." *J Clin Pathol* 50, (1997): 324-327.

- McDonald, J.C., J.M. Harris, and G. Berry. "Sixty Years on: the Price of Assembling Military Gas Masks in 1940." *Occupational and Environmental Medicine* 63, (2006): 852-55.
- McLemore, Monica R., Christine Miaskowski, Bradley E. Aouizerat, Lee-may Chen, and Marilyn J. Dodd. "Epidemiological and Genetic Factors Associated with Ovarian Cancer." *Cancer Nursing* 32, No. 4 (2009): 281-88.
- Medford, A. R. L., M. N. Sheppard et al., "An unusual cause of difficult asthma: talc granulomatous disease." *Grand Rounds* Vol. 5 (2005): 1-5.
- Medford, A. R. L. "Consider Talc Too in Poorly Controlled Asthma and Unexplained Bronchiolitis." *Chest* Vol. 143, No. 1 (January 2013): 278-279.
- Melaiu, Ombretta, Federica Gemignani, and Stefano Landi. "The Genetic Susceptibility in the Development of Malignant Pleural Mesothelioma." *Journal of Thoracic Disease* 10, no. Suppl 2 (January 2018): S246–52. <https://doi.org/10.21037/jtd.2017.10.41>.
- Melin, A., P. Sparen, I. Persson, A. Bergqvist. "Endometriosis and the risk of cancer with special emphasis on ovarian cancer." *Human Reproduction* Vol. 21, No. 5 (2006): 1237-1242.
- Meng, Qingsong, Weixue Sun, John Jiang, Nicole M. Fletcher, Michael P. Diamond, and Ghassan M. Saed. "Identification of Common Mechanisms between Endometriosis and Ovarian Cancer." *Journal of Assisted Reproduction and Genetics* 28 (2011): 917–23.
- Merritt, Melissa A., Adèle C. Green, Christina M. Nagle, Penelope M. Webb, and Australian Cancer Study (Ovarian Cancer) and Australian Ovarian Cancer Study Group. "Talcum Powder, Chronic Pelvic Inflammation and NSAIDs in Relation to Risk of Epithelial Ovarian Cancer." *International Journal of Cancer* 122, No. 1 (January 2008): 170–76.
- Michalowski, R. "Silica Granuloma at the Site of Circumcision for Phimosis: A Case Report." *Dermatologica* 166, (1983): 261-63.
- Mills, Paul K., Deborah G. Riordan, Rosemary D. Cress, and Heather A. Young. "Perineal Talc Exposure and Epithelial Ovarian Cancer Risk in the Central Valley of California." *International Journal of Cancer* 112, No. 3 (November 10, 2004): 458–64. (Bates No. JNJ000018682)
- Milne, R. L., and A. C. Antoniou. "Genetic Modifiers of Cancer Risk for BRCA1 and BRCA2 Mutation Carriers." *Annals of Oncology: Official Journal of the European Society for Medical Oncology* 22 Suppl 1 (January 2011): i11-17. <https://doi.org/10.1093/annonc/mdq660>.
- Milne, Roger L., and Antonis C. Antoniou. "Modifiers of Breast and Ovarian Cancer Risks for BRCA1 and BRCA2 Mutation Carriers." *Endocrine-Related Cancer* 23, no. 10 (2016): T69-84. <https://doi.org/10.1530/ERC-16-0277>.
- Møller, Peter, Pernille Høgh Danielsen, Kim Jantzen, Martin Roursgaard, and Steffen Loft. "Oxidatively Damaged DNA in Animals Exposed to Particles." *Critical Reviews in Toxicology* 43, No. 2 (February 2013): 96–118.
- Moon, Min-Chaul, Jung Duck Park, Byung Soon Choi, So Young Park, Dong Won Kim, Yong Hyun Chung, Naomi Hisanaga, and Il Je Yu. "Risk Assessment of Baby Powder Exposure through Inhalation." *Toxicological Research* 27, No. 3 (September 2011): 137–41.
- Moorman, P. G., R. T. Palmieri, L. Akushevich, A. Berchuck, and J. M. Schildkraut. "Ovarian Cancer Risk Factors in African-American and White Women." *American Journal of Epidemiology* 170, No. 5 (September 2009): 598–606.
- Mori, T., K. Nagata, T. Matsuit, T. Ishida, H. Ohami, T. Asanot. "Superoxide anions in the

- pathogenesis of talc-induced cerebral vasocontraction.” *Neuropathology and Applied Neurobiology* 21, (1995): 278-385.
- Mossman, Brooke T., Andrew Churg. “Mechanisms in the Pathogenesis of Asbestosis and Silicosis.” *Am J Respir Crit Care Med* Vol. 157, (1998): 1666-1680.
- Mostafa, S. A., C. B. Barger, R. W. Flower, N. B. Rosenshein, T. H. Parmley, and J. D. Woodruff. “Foreign Body Granulomas in Normal Ovaries.” *Obstetrics and Gynecology* 66, no. 5 (November 1985): 701–2.
- Murray, Peter J., Thomas A. Wynn. “Protective and pathogenic functions of macrophage subsets.” *Nat Rev Immunol* Vol. 11, No. 11 (2011): 723-727.
- Muscat, J. E., and M. S. Huncharek. “Causation and Disease: Biomedical Science in Toxic Tort Litigation.” *Journal of Occupational Medicine: Official Publication of the Industrial Medical Association* 31, no. 12 (December 1989): 997–1002.
- Muscat, Joshua E., and Michael S. Huncharek. “Perineal Talc Use and Ovarian Cancer: A Critical Review.” *European Journal of Cancer Prevention* 17, No. 2 (April 2008): 139–46.
- Nadler, Diana L., and Igor G. Zurbenko. “Estimating Cancer Latency Times Using a Weibull Model,” 2014, 8.
- Nakane, Hideo. “Translocation of particles deposited in the respiratory system: a systematic review and statistical analysis.” *Environ Health Prev Med*, 17 (2012): 263-274.
- Narod, Steven A. “Talc and Ovarian Cancer.” *Gynecologic Oncology* 141, no. 3 (2016): 410–12. <https://doi.org/10.1016/j.ygyno.2016.04.011>.
- Nelson, Heather H., and Karl T. Kelsey. “The Molecular Epidemiology of Asbestos and Tobacco in Lung Cancer.” *Oncogene* 21, no. 48 (October 21, 2002): 7284–88. <https://doi.org/10.1038/sj.onc.1205804>.
- Ness, R. “Does Talc Exposure Cause Ovarian Cancer?” *International Journal of Gynecological Cancer* 25, Supplement 1 (May 2015): 51.
- Ness, R. B., and C. Cottreau. “Possible Role of Ovarian Epithelial Inflammation in Ovarian Cancer.” *Journal of the National Cancer Institute* 91, No. 17 (September 1, 1999): 1459–67.
- Ness, Roberta B., Jeane Ann Grisso, Carrie Cottreau, Jennifer Klapper, Ron Vergona, James E. Wheeler, Mark Morgan, and James J. Schlesselman. “Factors Related to Inflammation of the Ovarian Epithelium and Risk of Ovarian Cancer.” *Epidemiology* 11, No. 2 (March 2000): 111–17.
- Newhouse, M.L. and K.R. Sullivan. “A Mortality Study of Workers Manufacturing Friction Materials: 1941-86.” *British Journal of Industrial Medicine* 46, (1989): 176-79.
- Newhouse, Muriel L., G. Berry, J.C. Wagner and Mary E. Turok. “A Study of the Mortality of Female Asbestos Workers.” *Brit. J. Industr. Med.* 29, (1972): 134-41.
- Nickens, Kristen P., Steven R. Patierno, Susan Ceryak. “Chromium genotoxicity: a double-edged sword.” *Chem Biol Interact* Vol. 188, No. 5 (November 2010): 276-288.
- Nicolini, Andrea, Paola Ferrari, Giuseppe Rossi, Angelo Carpi. “Tumour growth and immune evasion as targets for a new strategy in advanced cancer.” *Endocrine-Related Cancer* Vol. 25, No. 11 (2018): 577-604.
- NIOSH “Workplace Exposure to Asbestos: Review and Recommendations.” DHHS Publication No. 81-103 (April 1980): 1-47.
- NIOSH Pocket Guide to Chemical Hazards. (September 2007). Appendix C.
- NIOSH – CDC – Current Intelligence Bulletin 62 Revised Edition “Asbestos Fibers and Other

- Elongate Mineral Particles: State of the Science and Roadmap for Research.” April 2011.
- NIOSH. “CDC – Occupational Cancer – Carcinogen List – NIOSH Safety and Health Topic.” (2012)
- NIOSH “Fiber Exposure during Use of Baby Powders, Report No. IWS-36-6.,” July 1972. (JNJ000231304)
- NIOSH CURRENT INTELLIGENCE BULLETIN Revised Edition “Asbestos Fibers and Other Elongated Mineral Particles: State of the Science and Roadmap for Research,” January 2009.
- Nolan, Robert P. and Arthur M. Langer. *Chapter 9: Limitations of the Stanton Hypothesis*. (1993).
- Norman, R. J., M. Brannstrom. “Cytokines in the Ovary: Pathophysiology and Potential for Pharmacological Intervention.” *Pharmacol Ther*. Vol. 69, No. 3 (1996): 219-236.
- NTP “Asbestos.” (CAS No. 1332-21-4).” *Report on Carcinogens, Thirteenth Edition*. (2014).
- NTP “Toxicology and Carcinogenesis Studies of Talc.” (CAS No. 14807-96-6) In F344/N Rats and B6C3F Mice (Inhalation Studies).”
- Oberdörster, Günter, Eva Oberdörster, and Jan Oberdörster. “Nanotoxicology: An Emerging Discipline Evolving from Studies of Ultrafine Particles.” *Environmental Health Perspectives* 113, no. 7 (July 2005): 823–39. <https://doi.org/10.1289/ehp.7339>.
- Occupational Safety and Health Administration (OSHA) – Department of Labor “Occupational Exposure to Asbestos, Tremolite, Anthophyllite and Actinolite.” *Federal Register – Rules and Regulations* Vol. 57, No. 110 (June 8, 1992): 24310-24331.
- Occupational Safety and Health Administration (OSHA) – Department of Labor “OSHA Fact Sheet Asbestos” (2014): 1-2.
- Okada, Futoshi. “Beyond Foreign-Body-Induced Carcinogenesis: Impact of Reactive Oxygen Species Derived from Inflammatory Cells in Tumorigenic Conversion and Tumor Progression.” *International Journal of Cancer* 121, No. 11 (December 2007): 2364–72.
- Omenka, Sunday Samuel, Adebola Abosede Adeyi. “Heavy metal content of selected personal care products (PCPs) available in Ibadan, Nigeria and their toxic effects.” *Toxicology Reports* 3 (2016): 628-635.
- Oury, Tim D., Thomas A. Sporn, and Victor L. Roggli. (2014) *Pathology of Asbestos-Associated Diseases*. New York: Springer.
- Øvrevik, J., Marit Lag, Per Schwarze, and Magne Refsnes. “p38 and Src-ERK1/2 Pathways Regulate Crystalline Silica-Induced Chemokine Release in Pulmonary Epithelial Cells.” *Toxicological Sciences* 81, No. 2 (July 14, 2004): 480–90.
- Øvrevik, Johan, Magne Refsnes, Marit Låg, Jørn A. Holme, and Per E. Schwarze. “Activation of Proinflammatory Responses in Cells of the Airway Mucosa by Particulate Matter: Oxidant- and Non-Oxidant-Mediated Triggering Mechanisms.” *Biomolecules* 5, No. 3 (July 2, 2015): 1399–1440.
- Pace, E., Siena, L., Ferraro, M., Profita, M., Mondello, P., Chiappara, G., Montalbano, A.M., Giarratano, A., Bonsignore, G., Gjomarkaj, M. Role of prostaglandin E2 in the invasiveness, growth and protection of cancer cells in malignant pleuritis. *European Journal of Cancer*. 2006. 42(14):2382-2389.
- Paoletti, L., Caiazza, S., Donelli, G., Pocchiari. “Evaluation by Electron Microscopy Techniques of Asbestos Contamination in Industrial, Cosmetic, and Pharmaceutical Talcs.” *Regulatory Toxicology and Pharmacology* 4. (December 9, 1983): 222-235.
- Parmley, Tim H., and J. Donald Woodruff. “The Ovarian Mesothelioma.” *American Journal of*

- Obstetrics and Gynecology* 120, No. 2 (September 15, 1974): 234–41.
- Patierno, Steven R., Sugiyama, Masayasu, Basilion, James P., Costa, Max. “Preferential DNA-Protein Cross-Linking by NiCl₂ in Magnesium-insoluble Regions of Fractionated Chinese Hamster Ovary Cell Chromatin.” *Cancer Research* 45 (November 1985): 5787-5794.
- Pelling, D., and J.G. Evans. “Long-Term Peritoneal Tissue Response in Rats to Mould-Release Agents and Lubricant Powder Used on Surgeons’ Gloves.” *Food and Chemical Toxicology* 24, No. 5 (May 1986): 425–30.
- Penninkilampi, Ross, Guy D. Eslick. “Perineal Talc Use and Ovarian Cancer: A Systematic Review and Meta-Analysis.” *Epidemiology* Vol. 29, No. 1 (January 2018): 41-49.
- Peshkin, B., and et al. “Genetic Counseling and Testing for Hereditary Breast and Ovarian Cancer - UpToDate,” 2018.
https://www.uptodate.com/contents/genetic-counseling-and-testing-for-hereditary-breast-and-ovarian-cancer?search=Genetic%20counseling%20and%20testing%20for%20hereditary%20breast%20and%20ovarian%20cancer&source=search_result&selectedTitle=1~150&usage_type=default&display_rank=1.
- Peshkin, B., and et al. “Overview of Hereditary Breast and Ovarian Cancer Syndromes - UpToDate,” 2018.
https://www.uptodate.com/contents/overview-of-hereditary-breast-and-ovarian-cancer-syndromes?search=Overview%20of%20hereditary%20breast%20and%20ovarian%20cancer%20syndromes&source=search_result&selectedTitle=1~150&usage_type=default&display_rank=1.
- Peshkin, B., and et al. “Prevalence of BRCA1 and BRCA2 Mutations and Associated Cancer Risks - UpToDate,” 2018.
https://www.uptodate.com/contents/prevalence-of-brca1-and-brca2-mutations-and-associated-cancer-risks?search=prevalence-of-brca1-and-brca2-mu%E2%80%A6search_result%26selectedTitle%3D1~73%26usage_type%3Ddefault%26display_rank%3D1&source=search_result&selectedTitle=2~150&usage_type=default&display_rank=2.
- Peters, Annette, Veronesi, Bellina, Calderón-Garcidueñas, Lilian, Gehr, Peter, Chi Chen, Lung, Geiser, Marianne, Reed, William, Rothen-Rutishauser, Barbara, Schürch, Samuel, Schulz, Holger. “Translocation and Potential Neurological Effects of Fine and Ultrafine Particles a Critical Update.” *Particle and Fibre Toxicology* (September 8, 2006).
- Pierce, Jennifer S., Riordan, Alexander S., Miller, Eric W., Gaffney, Shannon H., Hollins, Dana M. “Evaluation of the Presence of Asbestos in Cosmetic talcum Products, Inhalation Toxicology.” 29:10, (2017) 443-456.
- Phillips, J C, and P J Young. “Studies on the Absorption and Disposition of H-Labelled Talc in the Rat, Mouse, Guinea-Pig and Rabbit.” *Food and Chemical Toxicology* 16, (1978): 161–63.
- Pickrell, John A., Morris B. Snipes, Janet M. Benson, Ray L. Hanson, Robert K. Jones, Robert L. Carpenter, James J. Thompson, Charles H. Hobbs, and Sandra C. Brown. “Talc Deposition and Effects after 20 Days of Repeated Inhalation Exposure of Rats and Mice to Talc.” *Environmental Research* 49, No. 2 (August 1989): 233–45.
- Pinto, Mauricio P., Carlos Balmaceda, Maria L. Bravo, Sumie Kato, Alejandra Villarroel, Gareth I. Owen, Juan Carlos Roa, et al. “Patient Inflammatory Status and CD4+/CD8+ Intraepithelial Tumor Lymphocyte Infiltration are Predictors of Outcomes in High-Grade Serous Ovarian Cancer.” *Gynecologic Oncology* (2018).

- Pira, E, C Pelucchi, L Buffoni, A Palmas, M Turbiglio, E Negri, P G Piolatto, and C La Vecchia. "Cancer Mortality in a Cohort of Asbestos Textile Workers." *British Journal of Cancer* 92, No. 3 (February 2005): 580–86.
- Pira, E, C Pelucchi, P G Piolatto, E Negri, G Discalzi and C La Vecchia. "First and Subsequent Asbestos Exposures in Relation to Mesothelioma and Lung Cancer Mortality." *British Journal of Cancer* 97, No. 9 (2007): 1300-1304.
- Pira, Enrico, Canzio Romano, Francesco S. Violante, Andrea Farioli, Giovanna Spatari, Carlo La Vecchia, and Paolo Boffetta. "Updated Mortality Study of a Cohort of Asbestos Textile Workers." *Cancer Medicine* 5, No. 9 (September 2016): 2623–28.
- Pizzo, Alfonsa, Salmeri, Francesca M., Ardita, Francesca V., Sofo, Vincenza, Tripepi, Maria, Marsico, Silvano. "Behaviour of Cytokine Levels in Serum and Peritoneal Fluid of Women with Endometriosis." *Gynecol Obstet Invest.* (2002) 54:82–87.
- Pogribny, Igor P., Rusyn, Ivan. "Environmental Toxicants, Epigenetics, and Cancer." *Adv Exp Med Biol.* (2013) 754: 215–232.
- Pogribny, Igor P., Rusyn, Ivan. "Role of Epigenetic Aberrations in the Development and Progression of Human Hepatocellular Carcinoma." *Cancer Lett.* (January 28, 2014) 342(2): 223–230.
- Poole, Elizabeth M., Lee, I-Min, Ridker, Paul M., Buring, Julie E., Hankinson, Susan E., Tworoger, Shelley S. "A Prospective Study of Circulating C-Reactive Protein, Interleukin-6, and Tumor Necrosis Factor α Receptor 2 Levels and Risk of Ovarian Cancer." *American Journal of Epidemiology.* Vol. 178, No. 8. (May 2, 2013).
- Pooley, F.D., Rowlands, N. "Chemical and Physical Properties of British Talc Powders." *Department of Mineral Exploitation.* (1975)
- Pott, F., and K.H. Friedrichs. "Tumors in Rats After the Intraperitoneal Administration of Fibrous Dusts (Translation)." *Naturwissenschaften* 59, No. 7 (1972).
- Product: *2017 TLVs and BEIs: ACGIH.* Accessed August 16, 2018.
- Pukkala, Eero, Jan Ivar Martinsen, Elsebeth Lynge, Holmfridur Kolbrun Gunnarsdottir, Pär Sparén, Laufey Tryggvadottir, Elisabete Weiderpass, and Kristina Kjaerheim. "Occupation and Cancer – Follow-up of 15 Million People in Five Nordic Countries." *Acta Oncologica* 48, No. 5 (2009): 646–790.
- Purdie, David, Adèle Green, Christopher Bain, Victor Siskind, Bruce Ward, Neville Hacker, Michael Quinn, Gordon Wright, Peter Russell, and Beatrice Susil. "Reproductive and Other Factors and Risk of Epithelial Ovarian Cancer: An Australian Case-Control Study." *International Journal of Cancer* 62, No. 6 (September 15, 1995): 678–84.
- Radic, I., I. Vucak, Jasminka Milosevic, Ana Marusic, S. Vukicevic and M. Marusic. "Immunosuppression Induced by Talc Granulomatosis in the Rat." *Clinical & Experimental Immunology* 73, (1988): 316-321.
- Rai, Alex J. and Raja M. Flores. "Association of Malignant Mesothelioma and Asbestos Related Conditions with Ovarian Cancer: Shared Biomarkers and a Possible Etiological Link?" *Clinical Chemistry and Laboratory Medicine* 49, No. 1 (2011): 5-7.
- Rakoff-Nahoum, Seth. "Why Cancer and Inflammation?" *Yale Journal of Biology and Medicine.* 79 (2006): 123-130.
- Ramanakumar, Agnihotram V., Marie-Élise Parent, Benoît Latreille, and Jack Siemiatycki. "Risk of Lung Cancer Following Exposure to Carbon Black, Titanium Dioxide and Talc: Results from Two Case–Control Studies in Montreal." *International Journal of Cancer* 122, No. 1 (2008): 183–89.

- Rauh-Hain, J. Alejandro, Growdon, Whitfield B., Rodriquez, Noah, Goodman, A.K., Boruta, David M., II., Schorge, John O., Horowitz, Carmen, Marcela G. del. "Carcinoma of the Ovary: A Case-Control Study." *Gynecologic Oncology*. (2011): 447-481.
- Rauh-Hain, Jose A., MD, Krivak, Thomas, C., MD, Carmen, Marcela G. del, MD, MPH, Olawaiye, Alexander B., MD. "Ovarian Cancer Screening and Early Detection in the General Population." *Reviews in Obstetrics & Gynecology*. Vol. 4, No. 1 (2011) 15-21.
- "Reference Manual on Scientific Evidence" Third Edition (2011).
- Reid, A., N. de Klerk, and A. W. Musk. "Does Exposure to Asbestos Cause Ovarian Cancer? A Systematic Literature Review and Meta-Analysis." *Cancer Epidemiology Biomarkers & Prevention* 20, No. 7 (July 2011): 1287-95.
- Reid, A., A. Segal, J. S. Heyworth, N. H. de Klerk, and A. W. Musk. "Gynecologic and Breast Cancers in Women After Exposure to Blue Asbestos at Wittenoom." *Cancer Epidemiology Biomarkers & Prevention* 18, No. 1 (January 2009): 140-47.
- Reid, A., J. Heyworth, N. de Klerk, and A. W. Musk. "The Mortality of Women Exposed Environmentally and Domestically to Blue Asbestos at Wittenoom, Western Australia." *Occupational and Environmental Medicine* 65, no. 11 (November 2008): 743-49.
<https://doi.org/10.1136/oem.2007.035782>.
- Reid, Alison, Peter Franklin, Nola Olsen, Jan Sleith, Latha Samuel, Patrick Aboagye-Sarfo, Nicholas de Klerk, and A.W. (Bill) Musk. "All-Cause Mortality and Cancer Incidence Among Adults Exposed to Blue Asbestos During Childhood." *American Journal of Industrial Medicine* 56, (2013): 133-45.
- Reid, Alison, Jane Heyworth, Nicholas H. de Klerk, and Bill Musk. "Cancer Incidence Among Women and Girls Environmentally and Occupationally Exposed to Blue Asbestos at Wittenoom, Western Australia." *International Journal of Cancer* 122, (2008): 2337-44.
- Reid, Brett M., Jennifer B. Permuth, and Thomas A. Sellers. "Epidemiology of Ovarian Cancer: A Review." *Cancer Biology & Medicine* 14, no. 1 (February 2017): 9-32.
<https://doi.org/10.20892/j.issn.2095-3941.2016.0084>.
- Report on Carcinogens (ROC), Fourteenth Edition. "Asbestos." National Toxicology Program, *Department of Health and Human Services* (2016): 1-3.
- Reuter, Simone, et al. "Oxidative Stress, Inflammation, and Cancer: How Are They Linked?" *Free Radic Biol Med*. (2010 December 1); 49(11): 1603-1616.
- Ring, Kari L., Christine Garcia, Martha H. Thomas, and Susan C. Modesitt. "Current and Future Role of Genetic Screening in Gynecologic Malignancies." *American Journal of Obstetrics and Gynecology* 217, no. 5 (2017): 512-21.
<https://doi.org/10.1016/j.ajog.2017.04.011>.
- Risch, Harvey A. "Hormonal Etiology of Epithelial Ovarian Cancer, With a Hypothesis Concerning the Role of Androgens and Progesterone." *Journal of the National Cancer Institute*, Vol. 90, No. 23. (December 2, 1998).
- Roberts, G. B. S. "Granuloma of the Fallopian Tube Due to Surgical Glove Talc Silicious Granuloma." *British Journal of Surgery* 34, No. 136 (April 1947): 417-23.
- Roberts, William Clifford. "Pulmonary Talc Granulomas, Pulmonary Fibrosis, and Pulmonary Hypertension Resulting from Intravenous Injection of Talc-Containing Drugs Intended for Oral Use." *Baylor University Medical Center Proceedings* 15, No. 3 (July 2002): 260-61.
- Robinson, B. W. S. "Asbestos and Cancer: Human Natural Killer Cell Activity is Suppressed by Asbestos Fibers but Can Be Restored by Recombinant Interleukin-2." *American Review*

- of Respiratory Disease* 139, No. 4 (April 1989): 897–901.
- Roggli, V L, P C Pratt, and A R Brody. “Asbestos Content of Lung Tissue in Asbestos Associated Diseases: A Study of 110 Cases.” *British Journal of Industrial Medicine* 43, No. 1 (January 1986): 18–28.
- Roggli, Victor L., and Philip C. Pratt. “Numbers of Asbestos Bodies on Iron-Stained Tissue Sections in Relation to Asbestos Body Counts in Lung Tissue Digests.” *Human Pathology* 14, No. 4 (April 1983): 355–61.
- Rohl, Arthur N. “Asbestos in Talc.” *Environmental Health Perspectives* 9, (December 1974): 129-132.
- Rohl, A.N., A.M. Langer, J. Selikoff, A. Tordini, R. Klimentidis, D.R. Bowes, and D.L. Skinner. “Consumer Talcums and Powders: Mineral and Chemical Characterization.” *Journal of Toxicology and Environmental Health* 2, (1976): 255-284.
- Rosenblatt, Karin A., Wayne A. Mathews, Janet R. Daling, Lynda F. Voigt, and Kathleen Malone. “Characteristics of Women Who Use Perineal Powders.” *Obstetrics & Gynecology* 92, No. 5 (November 1998): 753-6.
- Rosenblatt, Karin A., Moyses Szklo, and Neil B. Rosenshein. “Mineral Fiber Exposure and the Development of Ovarian Cancer.” *Gynecologic Oncology* 45, No. 1 (April 1992): 20–25.
- Rosenblatt, Karin A., Noel S. Weiss, Kara L. Cushing-Haugen, Kristine G. Wicklund, and Mary Anne Rossing. “Genital Powder Exposure and the Risk of Epithelial Ovarian Cancer.” *Cancer Causes & Control* 22, No. 5 (May 2011): 737–42.
- Rösler, Joachim A., Hans-Joachim Weitowitz, Heinz-Joachim Lange, Rotraud H. Weitowitz, Kurt Ulm, Klaus Rödelberger. “Mortality Rates in a Female Cohort Following Asbestos Exposure in Germany.” *JOM* 36, No. 8 (August 1994): 889-93.
- Ross, M. “Geology, Asbestos, and Health.” *Environmental Health Perspectives* 9 (December 1974): 123–24.
- Rossi, V.F., et al. “Acute Inflammatory Response Secondary to Intrapleural Administration of Two Types of Talc.” *European Respiratory Journal*, Volume 35, Number 2; (2010) 369-401.
- Rubino G.F., G. Scansetti, G. Piolatto, and G. Gay. “Mortality and Morbidity Among Talc Miners and Millers in Italy” (1979). 357-63.
- Rubino G.F., Giovanni Scansetti, Giorgio Piolatto, and Canzio A. Romano. “Mortality Study of Talc Miners and Millers.” *J Occup Med* 18, No. 3 (March 1976): 186-93.
- Saad, Antonio F., et al. “Microenvironment and Pathogenesis of Epithelial Ovarian Cancer.” *Horm Cancer*. (2010 December); 1(6): 277–290.
- Saed, Ghassan M., Ph.D. “LB-044 - Talcum Powder Enhances Cancer Antigen 125 Levels in Ovarian Cancer Cells and in Normal Ovarian Epithelial Cells.” (March 10, 2018).
- Saed, Ghassan M., et al. “Novel Expression of CD11b in Epithelial Ovarian Cancer: Potential Therapeutic Target.” *Gynecologic Oncology*, 148 (2018): 567-575.
- Saed, Ghassan M., Michael P. Diamond, and Nicole M. Fletcher. “Updates of the Role of Oxidative Stress in the Pathogenesis of Ovarian Cancer.” *Gynecologic Oncology* 145, No. 3 (June 2017): 595–602.
- Saed, Ghassan M., Robert T. Morris, and Nicole M. Fletcher. *Chapter 4: New Insights of into the Pathogenesis of Ovarian Cancer: Oxidative Stress*. (October 24, 2018).
- Saed, Ghassan M., Rouba Ali-Fehmi, Zhong L. Jiang, Nicole M. Fletcher, Michael P. Diamond, Husam M. Abu-Soud, and Adnan R. Munkarah. “Myeloperoxidase Serves as a Redox Switch That Regulates Apoptosis in Epithelial Ovarian Cancer.” *Gynecologic Oncology*

- 116, no. 2 (February 2010): 276–81. <https://doi.org/10.1016/j.ygyno.2009.11.004>.
- Saed, Ghassan M., Robert T. Morris, and Nicole M. Fletcher. *New Insights into the Pathogenesis of Ovarian Cancer: Oxidative Stress*, 2018.
- “Safety Assessment of Talc as Used in Cosmetics.” *Cosmetic Ingredient Review* (December 18, 2012).
- Savant, Sudha S., Shruthi Sriramkumar and Heather M. O’Hagan. “The Role of Inflammation and Inflammatory Mediators in the Development, Progression, Metastasis and Chemoresistance of Epithelial Ovarian Cancer.” *Cancers* 10, No. 251 (2018).
- Schildkraut, J. M., S. E. Abbott, A. J. Alberg, E. V. Bandera, J. S. Barnholtz-Sloan, M. L. Bondy, M. L. Cote, et al. “Association Between Body Powder Use and Ovarian Cancer: The African American Cancer Epidemiology Study (AACES).” *Cancer Epidemiology Biomarkers & Prevention* 25, No. 10 (October 2016): 1411–17.
- Seelig, M.G., M.D., et al. “The Talcum Powder Problem in Surgery and its Solution.” (1943) 950-954.
- Selevan, Sherry G. John M. Dement, Joseph K. Wagoner, and John R. Froines. “Mortality Patterns among Miners and Millers of Non-Asbestiform Talc: Preliminary Report.” *Journal of Environmental Pathology and Toxicology* 2, (1979): 273-84.
- Selikoff, Irving J., Jacob Churg, and E. Cuyler Hammond. “Asbestos Exposure and Neoplasia.” *JAMA* 188, No. 1 (April 6, 1964): 22-26.
- Sharma, Anjali, Satnam Singh, Sanjeev Kumar. “Ovarian Cancer Detection: Cause, Symptoms and Techniques” *International Journal of Core Engineering & Management* 2, No. 4 (July 2015): 34-42.
- Shim, Ilseob, Hyun-mi Kim, Sangyoung Yang, Min Choi, Gyun-baek Seo, Byung-Woo Lee, Byung-II Yoon, Pilje Kim, and Kyunghye Choi. “Inhalation of Talc Induces Infiltration of Macrophages and Upregulation of Manganese Superoxide Dismutase in Rats.” *International Journal of Toxicology* 34, No. 6 (November 2015): 491–99.
- Shinto, Hiroyuki, Tomonori Fukasawa, Kosuke Yoshisue, Mikihiro Tezuka, and Mayumi Orita. “Cell Membrane Disruption Induced by Amorphous Silica Nanoparticles in Erythrocytes, Lymphocytes, Malignant Melanocytes, and Macrophages.” *Advanced Powder Technology* 25, No. 6 (November 2014): 1872–81.
- Shukla, A., MacPherson, M.B., Hillegass, J., Ramos-Nino, M.E., Alexeeva, V., Vacek, P.M., Bond, J.P., Pass, H.I., Steele, C., Mossman, B.T. Alterations in gene expression in human mesothelial cells correlate with mineral pathogenicity. *Am J Respir Cell Mol Biol.* (2009). 41:114-123.
- Shushan, Asher, Ora Paltiel, Jose Iscovich, Uri Elchalal, Tamar Peretz and Joseph G. Schenker. “Human Menopausal Gonadotropin and the Risk of Epithelial Ovarian Cancer.” *Fertility and Sterility* 65, No. 1 (January 1996): 13-18.
- Sigel, Astrid, Sigel, Helmut, Sigel, Roland K.O. “Interrelations Between Essential Metal Ions and Human Diseases” *Metal Ions in Life Sciences* 13. Vol. 13 (2013).
- Sjosten, A. C. E., H. Ellis, G. A. B. Edelstam. “Retrograde migration of glove powder in the human female genital tract.” *Human Reproduction* Vol. 19, No. 4 (February 2004): 991-995.
- Song, Zhiwang, et al. “Expression of IL-1 α and IL-6 is Associated with Progression and Prognosis of Human Cervical Cancer.” *Med Sci Monit*, (2016) 22: 4475-4481.
- Soong, Thing Rinda, Brooke E. Howitt, Alexander Miron, Neil S. Horowitz, Frank Campbell, Colleen M. Feltmate, Michael G. Muto, et al. “Evidence for Lineage Continuity between

- Early Serous Proliferations (ESPs) in the Fallopian Tube and Disseminated High-Grade Serous Carcinomas.” *The Journal of Pathology*, July 25, 2018.
<https://doi.org/10.1002/path.5145>.
- Sparrow, S.A., and L.A. Hallam. “Talc Granulomas.” *British Medical Journal* 303, (July 6, 1991): 58.
- Stanton, Mearl F., Maxwell Layard, Andrew Tegeris, Eliza Miller, Margaret May, Elizabeth Morgan and Alroy Smith. “Relation of Particle Dimension to Carcinogenicity in Amphibole Asbestos and Other Fibrous Minerals.” *Journal of the National Cancer Institute* 67, No. 5 (November 1981): 965-75.
- Stanton, Mearl F. Maxwell Layard, Andrew Tegeris, Eliza Miller, Margaret May, and Elizabeth Kent. “Carcinogenicity of Fibrous Glass: Pleural Response in the Rat in Relation to Fiber Dimension.” *Journal of the National Cancer Institute* 58, No. 3 (March 1977): 587-603.
- Steffen, Joan, Triet Tran, Ella Fassler, and David S. Egilman. “Presence of Asbestos in Consumer Talc Products: Evaluating a ‘Zero Tolerance’ Policy” Powerpoint Presentation.
- Steiling, W., J. F. Almeida, H. Assaf Vandecasteele, S. Gilpin, T. Kawamoto, L. O’Keeffe, G. Pappa, K. Rettinger, H. Rothe, and A. M. Bowden. “Principles for the Safety Evaluation of Cosmetic Powders.” *Toxicology Letters*, August 17, 2018.
<https://doi.org/10.1016/j.toxlet.2018.08.011>.
- Steiling, W., M. Bascompta, P. Carthew, G. Catalano, N. Corea, A. D’Haese, P. Jackson, et al. “Principle Considerations for the Risk Assessment of Sprayed Consumer Products.” *Toxicology Letters* 227, no. 1 (May 16, 2014): 41–49.
<https://doi.org/10.1016/j.toxlet.2014.03.005>.
- Stenback F., V.-M. Wasenius, and J. Rowland. “Alveolar and Interstitial Changes in Silicate-Associated Lung Tumors in Syrian Hamsters.” *Cancer Research Monographs* 2 Chapter 21. (1986) 199-213.
- Stewart, Louise M., Katrina Spilsbury, Susan Jordan, Colin Stewart, C. D’Arcy J. Holman, Aime Powell, Joanne Reekie, and Paul Cohen. “Risk of High-Grade Serous Ovarian Cancer Associated with Pelvic Inflammatory Disease, Parity and Breast Cancer.” *Cancer Epidemiology* 55 (August 2018): 110–16. <https://doi.org/10.1016/j.canep.2018.05.011>.
- Straif, Kurt, Lamia Benbrahim-Tallaa, Robert Baan, Yann Grosse, Béatrice Secretan, Fatiha El Ghissassi, Véronique Bouvard, et al. “A Review of Human Carcinogens—Part C: Metals, Arsenic, Dusts, and Fibres.” *The Lancet Oncology* 10, No. 5 (May 2009): 453–54.
- Straif, Kurt. “Update of the Scientific Evidence on Asbestos and Cancer.” presented at the International Conference on Environmental and Occupational Determinants of Cancer: Interventions for Primary Prevention, Asturias (Avilés, Gijón), Spain, March 17, 2011.
- Sueblinvong, Thanasak and Michael E. Carney. “Ovarian Cancer: Risks” *Hawai’i Medical Journal* 68, (March 2009): 40-46.
- Szeszenia-Debrowska, Neonila, Urszula Wilczynska, Wieslaw Szymczak and Alicja Strzelecka. “Mortality Study of Workers Compensated for Asbestosis in Poland, 1970-1997.” *International Journal of Occupational Medicine and Environmental Health* 15, No. 3 (2002): 267-78.
- Tarchi, Marzia, Daniela Orsi, Pietro Comba, Marco de Santis, Roberta Pirastu, Giuseppe Battista, and Mauro Valiani. “Cohort Mortality Study of Rock Salt Workers in Italy.” *American Journal of Industrial Medicine* 25, No. 2 (February 1994): 251–56.
- Tee, Nicolin, Yingdong Zhu, Gysell M. Mortimer, Darren J. Martin and Rodney F. Minchin.

- “Fluoromica Nanoparticle Cytotoxicity in Macrophages Decreases with Size and Extent Of Uptake.” *International Journal of Nanomedicine* 10, (March 26, 2015), 2363-75.
- Terry, K. L., S. Karageorgi, Y. B. Shvetsov, M. A. Merritt, G. Lurie, P. J. Thompson, M. E. Carney, et al. “Genital Powder Use and Risk of Ovarian Cancer: A Pooled Analysis of 8,525 Cases and 9,859 Controls.” *Cancer Prevention Research* 6, No. 8 (August 2013): 811–21.
- Thomas, Terry L., and Patricia A. Stewart. “Mortality from Lung Cancer and Respiratory Disease Among Pottery Workers Exposed to Silica and Talc.” *American Journal of Epidemiology* 125, No. 1 (January 1987): 35–43.
- Todoric, Jelena, et al. “Targeting Inflammation in Cancer Prevention and Therapy.” *Cancer Prev Res (Phila)* (12): (2016 December): 9895–905.
- Tossavainen, A., A. Karjalainen, and P.J. Karhunen. “Retention of Asbestos Fibers in the Human Body.” *Environmental Health Perspectives* 102, Supplement 5 (October 1994): 253-55.
- Trabert, Britton, et al. “Aspirin, Nonaspirin Nonsteroidal Anti-inflammatory Drug, and Acetaminophen Use and Risk of Invasive Epithelial Ovarian Cancer: A Pooled Analysis in the Ovarian Cancer Association Consortium.” *JNCI, Oxford University Press* (2014).
- Trabert, Britton, Ligia Pinto, Patricia Hartge, Troy Kemp, Amanda Black, Mark E. Sherman, Louise A. Brinton, et al. “Pre-Diagnostic Serum Levels of Inflammation Markers and Risk of Ovarian Cancer in the Prostate, Lung, Colorectal and Ovarian Cancer (PLCO) Screening Trial.” *Gynecologic Oncology* 135, No. 2 (November 2014): 297–304.
- Trabert, Britton, Elizabeth M Poole, Emily White, Kala Visvanathan, Hans-Olov Adami, Garnet L Anderson, Theodore M Brasky, et al. “Analgesic Use and Ovarian Cancer Risk: An Analysis in the Ovarian Cancer Cohort Consortium.” *JNCI: Journal of the National Cancer Institute*, May 31, 2018. <https://doi.org/10.1093/jnci/djy100>.
- Tzonou, Anastasia, Argy Polychronopoulou, Chung-cheng Hsieh, Apostolos Rebelakos, Anna Karakatsani, and Dimitrios Trichopoulos. “Hair Dyes, Analgesics, Tranquilizers and Perineal Talc Application as Risk Factors for Ovarian Cancer.” *International Journal of Cancer* 55, (1993): 408-410.
- US EPA. “Health Assessment Document for Talc. | National Technical Reports Library - NTIS.” -600/8-91/217, 1992.
<https://ntrl.ntis.gov/NTRL/dashboard/searchResults/titleDetail/PB92239524.xhtml>.
- US EPA National Center for Environmental Assessment. “Arsenic, inorganic; CASRN 7440-38-2.” (1995).
- Vanderhyden, Barbara C, Tanya J Shaw, and Jean-François Ethier. “Animal Models of Ovarian Cancer.” *Reproductive Biology and Endocrinology : RB&E* 1 (October 7, 2003): 67.
<https://doi.org/10.1186/1477-7827-1-67>.
- Van Dyke, Knox, Shaily Patel, and Val Vallyathan. “Lucigenin Chemiluminescence Assay as an Adjunctive Tool for Assessment of Various Stages of Inflammation: A Study of Quiescent Inflammatory Cells.” *Journal of Biosciences* 28, No. 1 (February 2003): 115–19.
- Van Gosen, Bradley S. “Using the Geologic Setting of Talc Deposits as an Indicator of Amphibole Asbestos Content.” *Environmental Geology*. (2004): 45:920-939.
- Van Huisstede, A. et al. “Talcosis due to abundant use of cosmetic talcum powder.” *European Respiratory Review* Vol. 19, No. 116 (2010): 165-168.
- Vasama-Neuvonen, Eero Pukkala, Harri Paakkulainen, Pertti Mutanen, Elisabeth Weiderpass, Paolo Boffetta, et al. “Ovarian Cancer and Occupational Exposures in Finland.”

- American Journal of Industrial Medicine* 36, (1999): 83-89.
- Venkatesan, Priya. "Possible X Chromosome-Linked Transmission of Ovarian Cancer." *The Lancet. Oncology* 19, no. 4 (April 2018): e185.
[https://doi.org/10.1016/S1470-2045\(18\)30183-9](https://doi.org/10.1016/S1470-2045(18)30183-9).
- Venter, P. F., M. Iturralde. "Migration of a Particulate Radioactive Tracer from the Vagina to the Peritoneal Cavity and Ovaries." *SA Medical Journal* (1979): 917-919.
- Verdoodt, Freija, Christian Dehlendorff, Søren Friis, and Susanne K. Kjaer. "Non-Aspirin NSAID Use and Ovarian Cancer Mortality." *Gynecologic Oncology* 150, no. 2 (2018): 331-37. <https://doi.org/10.1016/j.ygyno.2018.06.018>.
- Virta, R.L. "The Phase Relationship of Talc and Amphiboles in a Fibrous Talc Sample." IH; Report of Investigations, 1985. <https://www.cdc.gov/niosh/nioshtic-2/10004328.html>.
- Virta, Robert L. "Talc and Pyrophyllite." *U.S. Geological Survey Minerals Yearbook* (1999).
- Wagner, J.C., G. Berry, T.J. Cooke, R.J. Hill, F.D. Pooley, and J.W. Skidmore. "Animal Experiments with Talc." (1977). (JNJ 000020991-98).
- Wang, Xiaorong, Sihao Lin, Ignatius Yu, Hong Qiu, Yajia Lan, and Eiji Yano. "Cause-Specific Mortality in a Chinese Chrysotile Textile Worker Cohort." *Cancer Science* 104, No. 2 (February 2013): 245-49.
- Wehner, A.P. "Biological Effects of Cosmetic Talc." *Food and Chemical Toxicology* 32, No. 12 (1994): 1173-84.
- Wehner, A.P., G.M. Zwicker, W.C. Cannon, C.R. Watson, and W.W. Carlton. "Inhalation of Talc Baby Powder by Hamsters." *Food and Cosmetics Toxicology* 15, No. 2 (January 1977): 121-29.
- Wehner, A.P., A.S. Hall, R.E. Weller, E.A. Lespel, and R.E. Schirmer. "Do Particles Translocate from the Vagina to the Oviducts and Beyond?" *Food and Chemical Toxicology* 23, No. 3 (1985): 367-72.
- Wehner, A.P., R.E. Weller, and E.A. Lepel. "On Talc Translocation from the Vagina to the Oviducts and Beyond." *Food and Chemical Toxicology* 24, No. 4 (1986): 329-38.
- Wells, I. P., P. A. Dubbins, W. F. Whimster. "Pulmonary disease caused by the inhalation of cosmetic talcum powder." *British Journal of Radiology* 52 (1979): 586-588
- Wendel, Jillian R. Hufgard, Xiyin Wang, and Shannon M. Hawkins. "The Endometriotic Tumor Microenvironment in Ovarian Cancer." *Cancers* 10, No. 261 (2018).
- Werebe, Eduardo Campos, et al. "Systemic Distribution of Talc After Intrapleural Administration in Rats" Laboratory and Animal Investigations, CHEST 115 (January 1999): 190-193.
- Werner, I. "Presence of Asbestos in Talc Samples." *Atenschutzinform* 21, no. 5 (1982).
- Wessling-Resnick, Marianne. "Iron Homeostasis and the Inflammatory Response." *Annu Rev Nutr.* (2010 August 21): 30: 105-122.
- Whittemore, Alice S, Marion L. Wu, Ralph S. Paffenbarger, Jr., Dorian L Sarles, James B Kampert, and Stella Grosser, et al. "Personal and Environmental Characteristics Related to Epithelial Ovarian Cancer." *American Journal of Epidemiology* 128, No. 6 (1988): 1228-40.
- Whysner, John, and Melissa Mohan. "Perineal Application of Talc and Cornstarch Powders: Evaluation of Ovarian Cancer Risk." *American Journal of Obstetrics and Gynecology* 182, No. 3 (March 2000): 720-24.
- Wiegand, HJ; Ottenwalder, H; Bolt, HM. (1985) Fast uptake kinetics in vitro of ⁵¹Cr(VI) by red blood cells of man and rat. *Arch Toxicol* 57:31-34.

- Wignall, B.K., and A.J. Fox. "Mortality of Female Gas Mask Assemblers." *British Journal of Industrial Medicine* 39, No. 1 (February 1, 1982): 34–38.
- Wilczynksa, Urszula, Wieslaw Szymczak, and Neonila Szeszenia. "Mortality from Malignant Neoplasms Among Workers of an Asbestos Processing Plant in Poland: Results of Prolonged Observation." *International Journal of Occupational Medicine and Environmental Health* 18, No. 4 (2005): 313–26.
- Wild, P., K. Leodolter, M. Refregier, H. Schmidt, T. Zidek, G. Haidinger. "A Cohort Mortality and Nested Case-Control Study of French and Austrian Talc Workers." *Occupational and Environmental Medicine* 59, No. 2 (February 2002): 98–105.
- Wild, P. "Lung Cancer Risk and Talc Not Containing Asbestiform Fibres: A Review of the Epidemiological Evidence." *Occupational and Environmental Medicine* 63, No. 1 (January 2006): 4–9.
- Wong, C., Ronald E. Hempling, M. Steven Piver, Nachimuthu Natarajan, and Curtis J. Mettlin. "Perineal Talc Exposure and Subsequent Epithelial Ovarian Cancer: A Case-Control Study." *Obstetrics & Gynecology* 93, No. 3 (March 1999): 372–76.
- Woodruff, J. D. "The Pathogenesis of Ovarian Neoplasia." *The Johns Hopkins Medical Journal* 144, no. 4 (April 1979): 117–20.
- World Bank, Operations Policy and Country Services, May 2009:
<https://siteresources.worldbank.org/EXTPOPS/Resources/AsbestosGuidanceNoteFinal.pdf>
- Worley, Michael J., Jr., et al. "Endometriosis-Associated Ovarian Cancer: A Review of Pathogenesis." *Int. J. Mol. Sci.* 14, (2013): 5367–5379.
- Wright, H.R., J.C. Wheeler et al. "Potential toxicity of retrograde uterine passage of particulate matter." *Journal of Long-Term Effects of Medical Implants* Vol. 6, Nos. 3–4 (1996): 199–206.
- Wu, A.H., C.L. Pearce, C.-C. Tseng, and M.C. Pike. "African Americans and Hispanics Remain at Lower Risk of Ovarian Cancer Than Non-Hispanic Whites after Considering Nongenetic Risk Factors and Oophorectomy Rates." *Cancer Epidemiology Biomarkers & Prevention* 24, No. 7 (July 2015): 1094–1100.
- Wu, Anna H., Celeste L. Pearce, Chiu-Chen Tseng, Claire Templeman, and Malcolm C. Pike. "Markers of Inflammation and Risk of Ovarian Cancer in Los Angeles County." *International Journal of Cancer* 124, No. 6 (March 15, 2009): 1409–15.
- Wu, Ruijin, et al. "Macrophage Contributions to Ovarian Function." *Human Reproduction Update*, Vol.10, No.2 (2004): pp. 119–133.
- Yafei, Zhu, et al. "Correlation Between Macrophage Infiltration and Prognosis of Ovarian Cancer-A Preliminary Study." *Biomedical Research*, 27 (2): (2016) 305–312.
- Yilmaz, Ercan, et al. "Immunohistochemical Analysis of Nuclear Factor Kappa Beta Expression in Etiopathogenesis of Ovarian Tumors." *Acta Cir Bras*; 33(7) (2018) 641–650.
- Zazenski, R., W. H. Ashton, D. Briggs, M. Chudkowski, J. W. Kelse, L. MacEachern, E. F. McCarthy, M. A. Nordhauser, M. T. Roddy, and N. M. Teetsel. "Talc: Occurrence, Characterization, and Consumer Applications." *Regulatory Toxicology and Pharmacology: RTP* 21, no. 2 (April 1995): 218–29.
- Zervomanoklakis, I, H.W. Ott, D Hadziomerovic, V. Mattle, B.E. Seeber, I. Virgolini, D. Heute, S. Kissler, G. Leyendecker, and L. Wildt. "Physiology of Upward Transport in the Human Female Genital Tract." *Annals of New York Academy of Sciences* 1101, no. 1 (2007): 1–20. <https://doi.org/10.1196/annals.1389.032>.

Produced Documents

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IMERSY 238457

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Depositions

Deposition of Alice M. Blount Dated 4.13.2018

Deposition and Exhibits of Laura M. Plunkett Dated 1.11.2017-1.13.2017

Deposition of Dr. Thomas Dydek Dated 8.21.18

Deposition and Exhibits of John Hopkins Dated 8.16.18-8.17.18

Deposition and Exhibits of Julie Pier Dated 9.12.18-9.13-18

Deposition and Exhibits of Pat Downey Dated 8.7.18-8.8.18

Deposition of Robert Glenn Dated 10.18.18

Deposition and Exhibits of Donald Hicks Dated 6.28.18-6.29.8

Reports

Expert Report of Michael M. Crowley, PhD

Expert Report of William E. Longo, PhD and Mark W. Rigler PhD. Analysis of J&J Baby Powder & Valiant Shower to Shower Talc Products for Amphibole (Tremolite) Asbestos Expert Report. August 2, 2017.

Expert Report of William E. Longo, PhD, Mark W. Rigler, PhD and William B. Egeland, M.S., P.G. Below the Waist Application of J&J Baby Powder Expert Report. September, 2017.

Expert Report of William E. Longo, PhD and Mark W. Rigler PhD. TEM Analysis of Historical 1978 Johnson's Baby Powder Sample for Amphibole Asbestos. February 16, 2018.

Expert Report of William E. Longo, PhD and Mark W. Rigler, PhD. November. 14, 2018.

Expert Report (Brower v. J&J) of Dr. Thomas Dydek

Expert Report (Brower v. J&J) of Dr. Laura Plunkett

Supplmental Expert Report (Brower v. J&J) of Dr. Laura Plunkett

Exhibit 38

Judith Zelikoff, Ph.D.

Page 1

IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF NEW JERSEY

- - -

IN RE: JOHNSON & :
JOHNSON TALCUM POWDER :
PRODUCTS MARKETING, :
SALES PRACTICES, AND : NO. 16-2738
PRODUCTS LIABILITY : (FLW) (LHG)
LITIGATION :
:
THIS DOCUMENT RELATES :
TO ALL CASES :

- - -

January 21, 2019

- - -

Videotaped deposition of
JUDITH ZELIKOFF Ph.D., taken pursuant to
notice, was held at the Sheraton Mahwah
Hotel, 1 International Boulevard, Mahwah,
New Jersey, beginning at 9:11 a.m., on
the above date, before Michelle L. Gray,
a Registered Professional Reporter,
Certified Shorthand Reporter, Certified
Realtime Reporter, and Notary Public.

- - -

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Judith Zelikoff, Ph.D.

Page 2	Page 4
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1	---			1	THE VIDEOGRAPHER: We are on		
2	EXHIBITS (Cont'd.)			2	the record. My name is Henry		
3	---			3	Marte. I am a videographer with		
4				4	Golkow Litigation Services.		
5	NO. DESCRIPTION PAGE			5	Today is January 21st, 2019,		
6	Zelikoff-46 Binder Labeled Mattenklott 2007 - Rossi 2009 480			6	and the time is 9:11 a.m.		
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12	Zelikoff-49 Experts of Transcript Of Robert Glenn 10/18/18 549			12	Judith Zelikoff.		
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20				20	having been first duly sworn, was		
21				21	examined and testified as follows:		
22				22	---		
23				23	EXAMINATION		
24				24	---		

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<p>1 BY MR. HEGARTY: 2 Q. Good morning, Dr. Zelikoff. 3 A. Good morning. 4 Q. My name is Mark Hegarty. I 5 represent the J&J defendants in this 6 action. Can you please state your full 7 name for the record, please? 8 A. Judith Terri Zelikoff. 9 Q. Dr. Zelikoff, who is your 10 current employer? 11 A. New York University School 12 of Medicine, also known as NYU Langone 13 Health. 14 Q. What is your title at New 15 York University School of Medicine? 16 A. Professor with tenure. 17 Q. How long have you held that 18 position? 19 A. Since 1982. 20 Q. Do you have any separate 21 personal consulting business for 22 litigation purposes? 23 A. I do not. 24 Q. Where do the fees go that</p>	<p>1 plaintiffs' counsel for your services in 2 this litigation? 3 A. \$350 per hour. 4 Q. Is there any difference in 5 your rate depending on whether it's 6 literature review, sitting for a 7 deposition, trial testimony? 8 A. Sitting for a deposition or 9 trial testimony is \$450. 10 Q. Did anyone outside of 11 plaintiffs' attorneys assist you in any 12 way with your expert report in this case? 13 A. No one with my expert 14 report. 15 Q. We were provided today a 16 copy of several invoices that you have 17 prepared for your work in this case. I'm 18 going to mark as Exhibit Number 1 a copy 19 of those invoices. 20 (Document marked for 21 identification as Exhibit 22 Zelikoff-1.) 23 BY MR. HEGARTY: 24 Q. Dr. Zelikoff, would you look</p>
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<p>1 you earn as an expert witness in this 2 case? 3 A. They go to household 4 expenses as well as charity. 5 Q. But they go to you, correct? 6 A. They go to me. 7 Q. Other than your work at New 8 York University and the fees that you're 9 earning as part of this litigation, do 10 you have any other sources of income? 11 A. Just income that I have from 12 advisory boards or -- when you -- when 13 you sit on panels, they also pay you. 14 But other than that, no. 15 Q. Tell me an example of an 16 advisory board for which you receive 17 income. 18 A. It's on a very sporadic 19 basis. And it depends on what it is. 20 But the NIEHS, National Institute of 21 Environmental Health Sciences. And it's 22 an NIH institute. And I serve as a -- I 23 review grants for them. 24 Q. What are you charging</p>	<p>1 at Exhibit Number 1 and tell me whether 2 those are all the invoices that you have 3 generated and provided to plaintiffs' 4 counsel in this case. 5 A. It appears to be. 6 Q. Thank you. The last work 7 noted is December 24, 2018. 8 Have you spent any 9 additional time on this case for which 10 you intend to bill plaintiffs' counsel -- 11 A. Yes, I have. 12 Q. -- that's not reflected in 13 the invoices? 14 A. Yes, I have. 15 Q. How much additional time? 16 A. Approximately 25 to 30 hours 17 by the end of this deposition. Not 18 including the deposition. 19 Q. With regard to these 20 invoices, have they all been paid? 21 A. Yes, they have. 22 Q. Were you paid a retainer for 23 your work on this case? 24 A. I don't recall.</p>

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<p style="text-align: right;">Page 18</p> <p>1 Q. Dr. Zelikoff, as you know 2 we're here to take your deposition in the 3 case of In Re Johnson & Johnson Talc 4 Litigation, which is an MDL setting. Are 5 you aware you've been designated as an 6 expert in that case? 7 A. I am aware. 8 Q. When were you first 9 contacted about serving as an expert in 10 this case? 11 A. Early 2017. I was 12 requested -- I was requested if I had 13 interest in it. 14 Q. The first invoice that you 15 provided has a date of April 5, 2017. 16 When in relation to the first invoice 17 entry was that initial contact? 18 A. To the best of my knowledge, 19 it was January or February. 20 Q. Of 2017? 21 A. Of 2017, right. 22 Q. Who contacted you? 23 A. Jennifer Emmel. 24 Q. Did you know her before she</p>	<p style="text-align: right;">Page 20</p> <p>1 representing plaintiffs? 2 A. No, sir. 3 Q. Did you agree to serve as an 4 expert witness at the time of Ms. Emmel's 5 first contact with you? 6 A. No, sir. I told her that I 7 would have to do some literature 8 searching myself and come up with a 9 conclusion as to whether or not I felt 10 comfortable based on the science in 11 serving in that capacity. 12 Q. At one point -- at what 13 point between -- at what point did you 14 come to or did -- strike that. 15 At what point did you agree 16 to serve as an expert witness in this 17 litigation in relation to that first 18 call? 19 A. Probably about a month 20 later. 21 Q. What did Ms. Emmel tell you 22 at that first call about the litigation? 23 MS. O'DELL: We just 24 instruct -- I mean conversations,</p>
<p style="text-align: right;">Page 19</p> <p>1 contacted you? 2 A. Not at all. 3 Q. How was the contact made, by 4 telephone? 5 A. By telephone. 6 Q. Apart from anything that 7 attorneys for plaintiffs may have told 8 you, do you know how she came to contact 9 you? 10 A. I'm not aware as to how she 11 came to contact me. 12 Q. Did you have any prior 13 litigation work with her? 14 A. Not with Ms. Emmel, no. 15 Q. How do you spell her name? 16 A. How do I -- 17 Q. Yes. 18 A. -- spell her name? 19 Q. Yes. 20 A. To the best of my knowledge, 21 it's E-M-M-E-L. 22 Q. Have you had any prior 23 litigation work with any of the lawyers 24 with whom you have met that are</p>	<p style="text-align: right;">Page 21</p> <p>1 in terms of -- let me just strike 2 that and say don't discuss 3 anything that you communicated to 4 us or we communicated to you after 5 you decided to become an expert in 6 the case. 7 BY MR. HEGARTY: 8 Q. Correct. I'm talking about, 9 right now I'm talking about that initial 10 phone call where you said you had not -- 11 where you did not agree at that point in 12 time to serve as an expert witness. 13 That's the only call I'm talking about. 14 What did Ms. Emmel tell you 15 about the litigation or about what they 16 wanted you to do at that first call? 17 A. Well, I don't remember the 18 details as it was about over a year ago. 19 But to the best of my knowledge and my 20 recollection, it was just that they 21 represented the plaintiffs in a case of 22 ovarian cancer and its relationship to 23 talcum powder products, and was I 24 familiar with it, did I know anything</p>

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<p>1 about it, and did I have -- did I have 2 interest in being associated with, and I 3 responded to her that I follow the 4 science, that's all I do is I follow the 5 science. 6 And if the science leads me 7 in a direction that I would have interest 8 or that I felt comfortable in doing this, 9 then I would let her know. 10 Q. What was your response when 11 she asked you if you were familiar with 12 the science of talc and ovarian cancer? 13 A. I was familiar with it at 14 that time in a superficial manner. I 15 work in a very high-powered department of 16 environmental medicine. And we discuss 17 current events over lunch. 18 Q. When you say in a 19 superficial manner, what do you mean? 20 A. Certainly not to the depth 21 that I'm aware of the issue currently. 22 Q. Is it correct that you had 23 not formed any opinions as to any link 24 between talc and ovarian cancer as of the</p>	<p>1 the time that you agreed to serve as an 2 expert witness in the case? 3 A. No, not -- not to my 4 recollection. 5 Q. Do you recall anything else 6 that you discussed with Ms. Emmel at that 7 first call besides what we talked about 8 already? 9 A. No, sir. 10 Q. Did Ms. Emmel at that first 11 call tell you anything about plaintiffs' 12 theory of causation or theory of 13 mechanism of action or biologic 14 plausibility? 15 A. No, sir, not at all. 16 Q. Did she send you any 17 documents before you agreed to serve as 18 an expert witness? 19 A. Not to my knowledge. I 20 think the -- I'm sure the literature 21 reviews that I did at that time were 22 solely my own. 23 Q. Had you heard of lawsuits 24 involving talc and ovarian cancer before</p>
Page 23	Page 25
<p>1 time of that first call with Ms. Emmel? 2 A. I had -- I had no opinion at 3 that time. 4 Q. Did you have any discussions 5 with Ms. Emmel or any other lawyer 6 representing plaintiffs between that 7 initial phone call and when you agreed to 8 serve as an expert witness? 9 A. To my -- to the best of my 10 knowledge, I had not spoken to 11 Ms. O'Dell. So to the best of my 12 knowledge it was just Ms. Emmel. 13 Q. Again, focusing on that 14 first phone call -- well, strike that. 15 Had you had any further 16 discussion with Ms. Emmel between the 17 time of that first call and the time you 18 agreed to serve as an expert witness? 19 A. I'm sorry, between the time 20 of the first call and the time I agreed, 21 could you repeat the question please? 22 Q. Sure. Did you have any 23 additional discussions with Ms. Emmel 24 between the time of the first call and</p>	<p>1 being contacted by Ms. Emmel? 2 A. I actually had not. 3 Q. What then were your sources 4 of knowledge about talc and ovarian 5 cancer as of the time of the first call? 6 A. The media, whatever I might 7 have read in the paper and any 8 discussions that might have been brought 9 up by my colleagues. 10 Q. Do you recall any colleague 11 who brought the -- anything up about talc 12 and ovarian cancer? 13 A. I do not recall a specific 14 colleague. Lunchroom chatter. 15 Q. Did you form any opinions 16 from the material you did read in the 17 media or from discussion with your 18 colleagues? 19 A. I had no opinion. 20 Q. And you were ultimately 21 retained and asked to give expert 22 opinions in this case, correct? 23 A. I was ultimately retained, 24 yes, correct.</p>

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<p>1 Q. The lawyers for the 2 plaintiffs in this case have paid you to 3 review materials and offer opinions, 4 correct? 5 MS. O'DELL: Objection to 6 the form. 7 THE WITNESS: Do I answer 8 the question? 9 BY MR. HEGARTY: 10 Q. Yes. 11 MS. O'DELL: Yes. 12 THE WITNESS: They have 13 remunerated me for my time and 14 effort in reading hundreds of 15 articles. 16 BY MR. HEGARTY: 17 Q. The opinions that you've 18 formulated were ultimately set out in 19 your November 16, 2018, MDL report, 20 correct? 21 A. That's correct. 22 Q. The hours you spent in 23 preparing that report are reflected in 24 the invoices we marked as Exhibit</p>	<p>1 testify today? 2 A. It would be in my invoice, 3 but if I had to approximate that without 4 the knowledge of having that in front of 5 me, I would say 30 to 50 hours. 6 Q. What attorneys did you meet 7 with to prepare for your deposition here 8 today? 9 A. I met with Ms. O'Dell and 10 Ms. Emmel. 11 Q. Anyone else? 12 A. In a face-to-face. 13 Q. Face-to-face. There were 14 phone calls as well? 15 A. There were -- one of -- one 16 of the phone calls, it may have been two. 17 I also -- Chris, and I'm not familiar 18 with your last name, sorry. 19 Chris from the -- 20 MS. O'DELL: Tisi. 21 THE WITNESS: Tisi? Chris 22 Tisi and Alistair -- 23 MR. FINDEIS: Findeis. 24 MS. O'DELL: Findeis.</p>
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<p>1 Number 1, correct? 2 A. I don't recall what exhibit 3 number it is, but it is in one of the 4 invoices. 5 Q. A description that you have 6 in your invoices includes report 7 preparation. Is that a description which 8 describes your -- the time you spent 9 preparing your report? 10 A. Yes, it is. 11 Q. Every entry under report 12 preparation would be the time that you 13 spent preparing your report? 14 A. Yes, that's true. That 15 could include reading material, searching 16 for material or writing. 17 Q. The invoices we marked as an 18 exhibit also reflect the time you spent 19 with lawyers for plaintiffs; is that 20 correct? 21 A. It does. 22 Q. With regard to your 23 deposition here today, how much time did 24 you spend preparing to come here and</p>	<p>1 THE WITNESS: Findeis -- was 2 on the phone, and there may have 3 been one or two others, but I 4 don't recall. 5 BY MR. HEGARTY: 6 Q. Have you spoken with any of 7 your colleagues about your work in this 8 litigation? 9 A. What -- can you explain what 10 you mean by colleagues? 11 Q. Well, you mentioned 12 colleagues in discussing talc and ovarian 13 cancer. So those colleagues. 14 A. If -- do you mean other 15 faculty? 16 Q. Correct. 17 A. And the question again, 18 please? 19 Q. Sure. Have you spoken with 20 other faculty at New York University 21 regarding your work on this litigation? 22 A. No, I have not. 23 Q. Have you told any faculty at 24 New York University of your opinions in</p>

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<p style="text-align: right;">Page 30</p> <p>1 this case?</p> <p>2 A. I have not.</p> <p>3 Q. Have you told anyone at NYU</p> <p>4 School of Medicine of your opinions?</p> <p>5 A. I have not. I have</p> <p>6 discussed, not my opinion, but in my</p> <p>7 class, my toxicology course, to graduate</p> <p>8 students at NYU.</p> <p>9 I have, in my course on</p> <p>10 speaking about reproductive toxicology</p> <p>11 and developmental toxicology, in</p> <p>12 discussing risk factors, two graduate</p> <p>13 students I have discussed -- I've</p> <p>14 included talc as a potential risk factor.</p> <p>15 Q. When did you start including</p> <p>16 talc as a potential risk factor in that</p> <p>17 course?</p> <p>18 A. Prior -- if you're asking me</p> <p>19 was it prior to or -- prior to my</p> <p>20 retainment, it was prior to my</p> <p>21 retainment.</p> <p>22 Q. So prior to your</p> <p>23 retainment -- let me -- let me word it</p> <p>24 differently.</p>	<p style="text-align: right;">Page 32</p> <p>1 A. Yes.</p> <p>2 Q. Does that continue to be the</p> <p>3 extent of any discussion you had with any</p> <p>4 students at New York University about</p> <p>5 talc and ovarian cancer?</p> <p>6 A. Well, right now we're on</p> <p>7 break. I -- I probably will -- I will</p> <p>8 continue after the deposition to also</p> <p>9 talk -- talk with them and list it as</p> <p>10 a -- as a risk factor for ovarian cancer.</p> <p>11 Q. What about -- strike that.</p> <p>12 Did you have discussions,</p> <p>13 that same discussion with toxicology</p> <p>14 students between -- I should say before</p> <p>15 you were contacted by Ms. Emmel and</p> <p>16 today, have you had -- continued to have</p> <p>17 that same discussion with your toxicology</p> <p>18 students?</p> <p>19 A. I've not --</p> <p>20 MS. O'DELL: Objection to</p> <p>21 form.</p> <p>22 Doctor, give me just a</p> <p>23 moment after the question if I</p> <p>24 need to object. Thank you.</p>
<p style="text-align: right;">Page 31</p> <p>1 Prior to the call from</p> <p>2 Ms. Emmel, you had included in your</p> <p>3 course to -- your toxicology course a</p> <p>4 discussion about talc and ovarian cancer?</p> <p>5 A. Not a discussion, just</p> <p>6 didactic lecture saying that this is the</p> <p>7 female reproductive tract. Ovarian</p> <p>8 cancer is part of an adverse outcome of</p> <p>9 disease. It's very prevalent. And there</p> <p>10 are factors including early menarche,</p> <p>11 late menopause, and there's some issues</p> <p>12 currently on the table as to whether</p> <p>13 cosmetic talc also plays a role.</p> <p>14 No opinion was given to my</p> <p>15 class. Just information.</p> <p>16 Q. Do you have any materials</p> <p>17 for your course, whether in PowerPoint</p> <p>18 form or other form that sets out that</p> <p>19 discussion you just had?</p> <p>20 A. No.</p> <p>21 Q. Is that the extent of the</p> <p>22 discussion that you had with your</p> <p>23 toxicology students about talc and</p> <p>24 ovarian cancer?</p>	<p style="text-align: right;">Page 33</p> <p>1 THE WITNESS: Shall I</p> <p>2 continue?</p> <p>3 BY MR. HEGARTY:</p> <p>4 Q. Sure.</p> <p>5 A. Could you repeat the</p> <p>6 question, please?</p> <p>7 Q. Sure. You mentioned that</p> <p>8 the discussion that we just went over was</p> <p>9 before your contact by Ms. Emmel,</p> <p>10 correct?</p> <p>11 A. I said that it started. My</p> <p>12 lectures started prior to my conversation</p> <p>13 with Ms. Emmel.</p> <p>14 Q. What was -- what was the</p> <p>15 name of the course that you had that</p> <p>16 lecture?</p> <p>17 A. Organ system toxicology.</p> <p>18 Q. Have you taught that course</p> <p>19 since your call with Ms. Emmel?</p> <p>20 A. Actually it's coming up</p> <p>21 this -- this semester, starting the 30th</p> <p>22 of January.</p> <p>23 Q. So between -- as of the</p> <p>24 first part of 2017 through today you have</p>

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<p>1 not taught that same course?</p> <p>2 A. It's taught every other</p> <p>3 year.</p> <p>4 Q. Have you communicated with</p> <p>5 anyone outside of plaintiffs' counsel in</p> <p>6 this case about your opinions in your</p> <p>7 report?</p> <p>8 A. Not about my opinions, no.</p> <p>9 Q. Have you talked with anyone</p> <p>10 outside of plaintiffs' counsel in this</p> <p>11 case about your report?</p> <p>12 A. Only to say that I -- to my</p> <p>13 friends, when I refuse to go anywhere</p> <p>14 with them, because I have to stay home</p> <p>15 and work, only to say that I'm working on</p> <p>16 a report.</p> <p>17 Q. Have you discussed the</p> <p>18 litigation or your report with any other</p> <p>19 experts retained by the plaintiffs in</p> <p>20 this case?</p> <p>21 A. No, sir, I have not.</p> <p>22 Q. Have you reviewed any of the</p> <p>23 other plaintiffs' experts' MDL reports in</p> <p>24 this litigation besides those referenced</p>	<p>1 Exhibit B. It should be the very last</p> <p>2 page of that document.</p> <p>3 A. Thank you.</p> <p>4 Q. The very last page of</p> <p>5 Exhibit B of your report, you list a</p> <p>6 number of expert reports, correct?</p> <p>7 A. I do. Deposition and</p> <p>8 exhibits.</p> <p>9 Q. Have you reviewed any other</p> <p>10 expert reports -- strike that.</p> <p>11 Did you review any other</p> <p>12 expert reports for purposes of your</p> <p>13 expert report besides those listed here?</p> <p>14 A. No, sir. Unless --</p> <p>15 Dr. Longo, December 2018 supplement, that</p> <p>16 was a report, and I did review that.</p> <p>17 Q. We were provided today with</p> <p>18 a copy of a report of Longo and Rigler,</p> <p>19 January 15, 2019. And I'm going to mark</p> <p>20 that as Exhibit 3.</p> <p>21 (Document marked for</p> <p>22 identification as Exhibit</p> <p>23 Zelikoff-3.)</p> <p>24 BY MR. HEGARTY:</p>
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<p>1 in your report?</p> <p>2 A. I reviewed Dr. Dydek's. I</p> <p>3 reviewed -- did you say the plaintiffs'</p> <p>4 witnesses?</p> <p>5 Q. Yeah, let me -- let me -- in</p> <p>6 your report -- and I can -- we can get it</p> <p>7 out here in a moment. But you list</p> <p>8 the -- in your list of reports, you list</p> <p>9 the report of Michael Crowley.</p> <p>10 A. I'm sorry, sir. Can you --</p> <p>11 Q. It's in Exhibit B at the end</p> <p>12 of Exhibit B of your report. If you need</p> <p>13 a copy I can give it to you now.</p> <p>14 A. Can you give me a copy.</p> <p>15 (Document marked for</p> <p>16 identification as Exhibit</p> <p>17 Zelikoff-2.)</p> <p>18 BY MR. HEGARTY:</p> <p>19 Q. I'm marking Exhibit 2 Dr.</p> <p>20 Zelikoff's report that was provided to us</p> <p>21 in this case.</p> <p>22 A. Thank you. And what page</p> <p>23 are you referring to?</p> <p>24 Q. It is the last page of</p>	<p>1 Q. Is that the supplemental</p> <p>2 report that you described for us?</p> <p>3 A. It is, sir. It's an</p> <p>4 analysis Johnson & Johnson Historical</p> <p>5 Product Containers and Imerys' Historical</p> <p>6 Railroad Car Samples, etc..</p> <p>7 Q. That report is dated</p> <p>8 January 15th, 2019, correct?</p> <p>9 A. Yes, sir.</p> <p>10 Q. When did you receive this</p> <p>11 report?</p> <p>12 A. In January.</p> <p>13 Q. When in relation to</p> <p>14 January 15, 2019?</p> <p>15 A. Today is the --</p> <p>16 Q. Is the 21st.</p> <p>17 A. Today is the 21st. I would</p> <p>18 say somewhere between the 15th and the</p> <p>19 21st. Actually it was this past Saturday</p> <p>20 as it was placed in my Dropbox and I</p> <p>21 could not open my Dropbox.</p> <p>22 Q. When did you review Exhibit</p> <p>23 Number 3?</p> <p>24 A. That same report?</p>

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<p>1 Q. Yes.</p> <p>2 A. I received it on Saturday.</p> <p>3 I reviewed it on Sunday.</p> <p>4 Q. How much time did you spend</p> <p>5 reviewing this additional Longo and</p> <p>6 Rigler report?</p> <p>7 A. Sorry. About three hours.</p> <p>8 Q. Did you read every page?</p> <p>9 A. I read -- I reviewed each</p> <p>10 page but I did not scrutinize every page.</p> <p>11 Q. Did you read the entirety of</p> <p>12 the text in this supplemental report?</p> <p>13 A. May I see the report,</p> <p>14 please.</p> <p>15 MS. O'DELL: Objection.</p> <p>16 Asked and answered. That's the</p> <p>17 same question.</p> <p>18 THE WITNESS: Should I</p> <p>19 answer?</p> <p>20 MS. O'DELL: Yes, you may.</p> <p>21 THE WITNESS: I reviewed the</p> <p>22 text going up to Page 32 with</p> <p>23 greater rigor than I did the</p> <p>24 tables.</p>	<p>1 A. The attorneys.</p> <p>2 Q. I'm going to show you --</p> <p>3 A. Plaintiffs' attorneys.</p> <p>4 (Document marked for</p> <p>5 identification as Exhibit</p> <p>6 Zelikoff-4.)</p> <p>7 BY MR. HEGARTY:</p> <p>8 Q. I'm going to show you what I</p> <p>9 marked as Exhibit Number 4. This is the</p> <p>10 MDL report provided to us for Michael</p> <p>11 Crowley.</p> <p>12 A. Mm-hmm.</p> <p>13 Q. Did you read the entirety of</p> <p>14 that report?</p> <p>15 A. I cannot say that I read the</p> <p>16 entirety of this report. I reviewed the</p> <p>17 report.</p> <p>18 Q. Okay. Well, your report is</p> <p>19 dated November 16, 2018. And that report</p> <p>20 is dated November 12, 2012, -- 2018.</p> <p>21 When did you receive the report by</p> <p>22 Dr. Crowley in relation to the date on</p> <p>23 the first page, November 12th.</p> <p>24 A. I really cannot say with</p>
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<p>1 BY MR. HEGARTY:</p> <p>2 Q. When you say "reviewed,"</p> <p>3 does that mean that you read every -- all</p> <p>4 the words on every page up to Page 32?</p> <p>5 A. I did.</p> <p>6 Q. You included in the list of</p> <p>7 reports that you reviewed, the report of</p> <p>8 Michael Crowley, correct?</p> <p>9 A. Every one of the reports</p> <p>10 were not read with the -- read with</p> <p>11 the -- sorry, I'm caught up in the</p> <p>12 microphone -- were not read with the same</p> <p>13 intensity and duration of time put into</p> <p>14 it. I reviewed it. To what extent, I'm</p> <p>15 not clear at this moment.</p> <p>16 Q. The first report that you</p> <p>17 list in the list of reports in Exhibit B</p> <p>18 is the expert report of Michael M.</p> <p>19 Crowley, correct?</p> <p>20 A. It's written that way, yes.</p> <p>21 Q. Did you prepare this list of</p> <p>22 reports?</p> <p>23 A. I did not.</p> <p>24 Q. Who did?</p>	<p>1 certainty. It seems to me that I</p> <p>2 received this prior to my report</p> <p>3 conclusion.</p> <p>4 Q. There are 212 pages there.</p> <p>5 Again, did you read every word of every</p> <p>6 page?</p> <p>7 A. No, sir. Did I look at</p> <p>8 every word of every page? Yes.</p> <p>9 Q. No, my question is did you</p> <p>10 read every word of every page.</p> <p>11 A. My answer is --</p> <p>12 MS. O'DELL: She answered</p> <p>13 your question.</p> <p>14 THE WITNESS: -- I looked at</p> <p>15 every page.</p> <p>16 BY MR. HEGARTY:</p> <p>17 Q. Did you read all the</p> <p>18 references that he has in that report?</p> <p>19 A. I looked at the references.</p> <p>20 Q. Did you actually pull the</p> <p>21 references and read the citations that he</p> <p>22 refers to?</p> <p>23 A. No, sir. I did my own -- my</p> <p>24 own literature search in terms of</p>

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<p>1 fragrance and chemicals within the</p> <p>2 fragrances. And I did receive that as an</p> <p>3 exhibit this morning.</p> <p>4 Q. I'm sorry. What did you</p> <p>5 say?</p> <p>6 A. I said I did my own</p> <p>7 literature search in terms of fragrances,</p> <p>8 and I think you received a copy of that</p> <p>9 this morning. In that report that I did,</p> <p>10 that I prepared, I was assessing</p> <p>11 carcinogenicity of each of the compounds.</p> <p>12 Q. Going back to the Crowley</p> <p>13 report, did you read all the tables in</p> <p>14 that report?</p> <p>15 A. I did not read. I reviewed.</p> <p>16 Q. What is --</p> <p>17 A. I looked at them.</p> <p>18 Q. Okay. What is the</p> <p>19 difference between reading and reviewing</p> <p>20 to you?</p> <p>21 A. In my mind, reading is</p> <p>22 in-depth assessment, and whereas</p> <p>23 reviewing is looking over. Reading is</p> <p>24 more intense.</p>	<p>1 Dr. Crowley's report. And with that I --</p> <p>2 I used the case number. I reviewed each</p> <p>3 one of the chemicals in terms of their</p> <p>4 potential carcinogenicity by, number one,</p> <p>5 putting -- writing down the chemical,</p> <p>6 looking to see if there were other</p> <p>7 structures or chemicals -- or chemicals</p> <p>8 that had similar names.</p> <p>9 I reviewed through Google,</p> <p>10 through PubMed and through Tox Lit and</p> <p>11 IARC reports to see whether or not there</p> <p>12 was a listing for them in terms of</p> <p>13 carcinogenicity. And that is the result.</p> <p>14 This is the result.</p> <p>15 Q. When did you do all of that?</p> <p>16 A. I did that post the</p> <p>17 report --</p> <p>18 Q. When -- sorry.</p> <p>19 A. -- as part of my preparation</p> <p>20 for the deposition.</p> <p>21 Q. When did you do it post</p> <p>22 report in relation to today?</p> <p>23 A. One to two weeks ago.</p> <p>24 Q. Did you review -- strike</p>
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<p>1 Q. You pointed to us -- pointed</p> <p>2 to us -- strike that.</p> <p>3 You pointed to the document</p> <p>4 that was provided to us this morning,</p> <p>5 which you say is -- what I think you said</p> <p>6 reflects your own literature search with</p> <p>7 regard to fragrances; is that correct?</p> <p>8 A. Mine and a student.</p> <p>9 Q. What student?</p> <p>10 A. A graduate student in my</p> <p>11 laboratory.</p> <p>12 (Document marked for</p> <p>13 identification as Exhibit</p> <p>14 Zelikoff-5.)</p> <p>15 BY MR. HEGARTY:</p> <p>16 Q. I've marked as Exhibit</p> <p>17 Number 5 the document that was produced</p> <p>18 to us this morning. Can you tell me what</p> <p>19 Exhibit Number 5 is.</p> <p>20 A. Exhibit Number 5 is -- is a</p> <p>21 list of the chemicals that -- part of</p> <p>22 which, if not in its entirety, were taken</p> <p>23 from the fragrances that were -- and the</p> <p>24 chemicals that were listed in</p>	<p>1 that.</p> <p>2 Did you read all the MSDSes</p> <p>3 that you list in Exhibit Number 5?</p> <p>4 A. I did not read all of the</p> <p>5 MSDSes. But I did look at them. I</p> <p>6 reviewed them to make sure they were</p> <p>7 accurate.</p> <p>8 Q. Did you -- did you look at</p> <p>9 and review every MSDS listed in Exhibit</p> <p>10 Number 5?</p> <p>11 A. No, sir.</p> <p>12 Q. I'm sorry?</p> <p>13 A. No, sir.</p> <p>14 Q. Approximately how many did</p> <p>15 you look at in review?</p> <p>16 A. I would say I looked at</p> <p>17 perhaps half. Looked -- looked at, not</p> <p>18 reviewed.</p> <p>19 Q. But with regard to your</p> <p>20 analysis of the fragrances that are</p> <p>21 reportedly in Johnson's Baby Powder, you</p> <p>22 did not do any of your own analysis as of</p> <p>23 the time of your report, correct?</p> <p>24 A. I --</p>

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<p>1 MS. O'DELL: Objection to 2 the form. 3 THE WITNESS: I did no 4 analysis except to gather the 5 information that is out there by 6 reputable organizations. 7 BY MR. HEGARTY: 8 Q. Well, did you gather that 9 information before you completed your 10 expert report? 11 A. I did this after my expert 12 report. 13 Q. And my question was, before 14 your expert report, did you do any of 15 your own analysis of the fragrances that 16 we -- are listed in Exhibit Number 5? 17 MS. O'DELL: Objection to 18 form. 19 THE WITNESS: I'm not sure 20 what you mean by analysis. 21 BY MR. HEGARTY: 22 Q. Well, did you do any of your 23 own research, review of the literature, 24 anything with regard to fragrances as of</p>	<p>1 THE WITNESS: I -- 2 post-report, I did my own search. 3 BY MR. HEGARTY: 4 Q. But my question was, before 5 your report, with regard to Dr. Crowley's 6 report, did you actually pull the 7 literature references that he cites and 8 read them yourself? 9 A. No, sir. 10 Q. You also make reference to 11 reviewing Dr. Longo's report, MDL report, 12 which is dated November 14, 2018. That's 13 in the last page of Exhibit Number B. Do 14 you see that? 15 A. I -- I see that, yes. 16 Q. Did you read every page of 17 that report? 18 A. No, sir, I did not. But I 19 did read every page of the December 2018 20 Longo mass supplement report. 21 Q. Well, focusing on the 22 November 14, 2018, report, that report is 23 over 2,000 pages. Are you aware of that? 24 A. Yes, sir.</p>
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<p>1 the time of your signing of your expert 2 report November 16, 2018? 3 A. I very briefly looked up 4 limonene and eugenol. And it wasn't in 5 regards to this case. It was in regards 6 to work that I do with electronic 7 cigarettes. They are being used as 8 flavorants. 9 Q. Was that the extent of your 10 review of the fragrances as of the time 11 of your expert report, November 16, 2018? 12 MS. O'DELL: Object to form. 13 You may answer. 14 THE WITNESS: Whatever is in 15 the report from Dr. Crowley that 16 listed, I looked at those. 17 BY MR. HEGARTY: 18 Q. But as you indicated, you 19 did not read all the citations, the 20 literature resources that Dr. Crowley 21 cites in his report and review them 22 yourself? 23 MS. O'DELL: Object to the 24 form.</p>	<p>1 Q. Did you read all 2,000 2 pages? 3 A. No, sir. I did not. 4 Q. Did you read any of those 5 2,000 pages? 6 A. I reviewed several of those 7 pages. 8 Q. Okay. How about the rest of 9 the reports that are listed there? Did 10 you read every page of the reports that 11 are listed there? 12 A. I read every page of the 13 Dr. Thomas Dydek's report. And I read 14 two-thirds of Dr. Plunkett's. 15 Q. As to the rest, did you 16 review the remaining reports? 17 MS. O'DELL: Object to the 18 form. 19 BY MR. HEGARTY: 20 Q. Or not look at them at all? 21 A. I glanced over them. 22 Q. Do you recall if you were 23 ever provided any draft reports from any 24 of the plaintiffs' experts in the MDL,</p>

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<p>1 where you understood them to be drafts? 2 A. I never received anything 3 that I understood to be a draft document. 4 (Document marked for 5 identification as Exhibit 6 Zelikoff-6.) 7 BY MR. HEGARTY: 8 Q. Dr. Zelikoff, I'm marking 9 Exhibit Number 6 a copy of your 10 deposition notice for purposes of today's 11 deposition. 12 A. Yes, sir. I see it. 13 Q. Did you have a chance to 14 look at that before today? 15 A. I did not. 16 Q. What materials did you bring 17 with you to the deposition today? 18 MS. O'DELL: I would just 19 reassert that the objections that 20 plaintiffs have served regarding 21 certain of the requests and would 22 state that Dr. Zelikoff has 23 brought binders of her cited 24 materials, and then I believe I</p>	<p>1 Q. Is it correct that the 2 binders to your right are copies of 3 everything in -- under the listing -- 4 under the heading of Materials and Data 5 Considered? 6 MS. O'DELL: Object to the 7 form. 8 THE WITNESS: I cannot say 9 that every single paper in here is 10 in there. Maybe in something that 11 I have looked up, but I can't say 12 with likely certainty that yes, 13 everything is in there. Although 14 I cannot tell you that I reviewed 15 every single one and matched it to 16 this page. 17 BY MR. HEGARTY: 18 Q. Who prepared -- who prepared 19 the document Materials and Data 20 Considered? 21 A. What do you mean by 22 prepared? 23 Q. Did you prepare it? 24 MS. O'DELL: Object to the</p>
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<p>1 gave you a jump drive of all the 2 reference materials. 3 BY MR. HEGARTY: 4 Q. Let me go back to my 5 question. Sitting to your right are 6 binders of materials. Do you know what 7 those binders are, Dr. Zelikoff? 8 A. I do know what those black 9 binders are to my right. 10 Q. What are they? 11 A. They are binders containing 12 materials, papers, literature -- 13 literature, in alphabetical order of 14 papers that are relevant to my -- to my 15 testimony, as well as production 16 documents which include letters, reports 17 of internal documents. 18 Q. Your Exhibit B in your 19 report starts with a page Materials and 20 Data Considered. Do you see that? 21 A. Page please? 22 Q. It's Exhibit B. 23 A. Materials and data 24 considered, I have it, yes, sir.</p>	<p>1 form. 2 THE WITNESS: I supplied 3 data, references, and in 4 coordination and complementation 5 with the plaintiffs' attorneys, 6 they prepared this. 7 (Document marked for 8 identification as Exhibit 9 Zelikoff-7.) 10 BY MR. HEGARTY: 11 Q. I'm marking as Exhibit 12 Number 7 a flash drive that we were 13 provided here today. Do you know what 14 Exhibit Number 7 is? 15 A. I do not. 16 Q. Do you know what's contained 17 on the flash drive? 18 A. I have not seen the data 19 within the flash drive. 20 MS. O'DELL: I'll just 21 represent that I prepared the 22 flash drive and the flash drive 23 has all the materials on 24 Exhibit B, on behalf of</p>

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<p>1 Dr. Zelikoff. 2 BY MR. HEGARTY: 3 Q. Are the materials you also 4 cited -- I'm sorry. Are the references 5 you also cited in the body of your report 6 contained in those notebooks to your 7 knowledge? 8 A. To my knowledge, they are. 9 Q. Are the materials that -- 10 that are in those notebooks materials you 11 reviewed or had access to prior to 12 completion of your expert report? 13 A. Prior to the completion. 14 However I also prepared my own. So in 15 going through -- in coming to my 16 conclusion and opinion, I also went 17 through the literature using various 18 websites including, as I said Tox Lit, 19 Google and PubMed. And I arranged my 20 documents that I thought were relevant 21 after reviewing all of the ones that came 22 up in my literature search, and I 23 reviewed the abstracts and if I found 24 them to be relevant, I placed them in --</p>	<p>1 Q. You had not read that 2 manuscript though at the time you 3 completed your report, correct? 4 A. No, I did not, sir. 5 Q. So that manuscript did not 6 inform the opinions set out in your 7 report, correct? 8 MS. O'DELL: Objection to 9 form. 10 THE WITNESS: Do I answer? 11 MS. O'DELL: Yes, you may 12 answer. 13 THE WITNESS: Okay. 14 MS. O'DELL: Yes. 15 THE WITNESS: I -- I had 16 access to an abstract from the 17 same author with emerging results 18 that was brought forward in larger 19 context and in greater detail in 20 the publication. So I had -- so 21 the abstract did go into my 22 thinking. 23 BY MR. HEGARTY: 24 Q. The manuscript though we</p>
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<p>1 in order and in bins, in silos, in 2 different areas, and I prepared my own. 3 Q. We were also provided today, 4 this morning, what I've marked as Exhibit 5 Number 8 which is a manuscript from a 6 publication called Reproductive Sciences. 7 The lead author, Ghassam Saed. 8 (Document marked for 9 identification as Exhibit 10 Zelikoff-8.) 11 BY MR. HEGARTY: 12 Q. Can you tell me when you 13 received that manuscript? 14 A. I received the manuscript in 15 December. 16 Q. Approximately when in 17 December? 18 A. Let me say that it was 19 either December or early January. I 20 cannot be more exact than that. 21 Q. Have you read that 22 manuscript? 23 A. Have I -- yes, I've read 24 this manuscript.</p>	<p>1 marked as Exhibit 8 did not go into your 2 thinking? 3 A. The manuscript -- no, sir, 4 it did not. It did post my report and it 5 added supplementary and compelling 6 evidence for my opinion. 7 (Document marked for 8 identification as Exhibit 9 Zelikoff-9.) 10 BY MR. HEGARTY: 11 Q. I've also marked as Exhibit 12 Number 9 another document we were 13 provided this morning which is -- which 14 is called Draft Screening Assessment. 15 When did you receive this 16 draft screening assessment? 17 A. January. 18 Q. Approximately when in 19 January? 20 A. About two weeks ago. 21 Q. Who -- what was your source 22 for getting that document? 23 A. Ms. Emmel. 24 Q. Did Ms. Emmel also provide</p>

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<p style="text-align: right;">Page 58</p> <p>1 the -- the Saed manuscript?</p> <p>2 A. Yes, sir, she did.</p> <p>3 Q. So neither the Canadian</p> <p>4 assessment nor Dr. Saed's manuscript were</p> <p>5 materials you found on your own, correct?</p> <p>6 A. Correct.</p> <p>7 Q. Do you know how Ms. Emmel</p> <p>8 came to receive an unpublished</p> <p>9 manuscript, apart from any discussions</p> <p>10 that you had with plaintiffs' counsel?</p> <p>11 A. Actually, which manuscript</p> <p>12 are you referring to?</p> <p>13 Q. Well, there's only one</p> <p>14 manuscript in front of you?</p> <p>15 A. Reproductive Science --</p> <p>16 Q. Dr. -- yes.</p> <p>17 A. -- Dr. Saed?</p> <p>18 To my knowledge, this has --</p> <p>19 and seeing the cover letter that was</p> <p>20 associated with this, this is not a</p> <p>21 manuscript. This is an in-press</p> <p>22 manuscript, and there is a very large</p> <p>23 difference.</p> <p>24 Q. Okay. Apart from anything</p>	<p style="text-align: right;">Page 60</p> <p>1 that is a supplement of that or a -- an</p> <p>2 adjacent document.</p> <p>3 Q. Do you have that document</p> <p>4 with you?</p> <p>5 A. Perhaps. I do, yes, sir.</p> <p>6 Q. May I see it, please.</p> <p>7 (Document marked for</p> <p>8 identification as Exhibit</p> <p>9 Zelikoff-10.)</p> <p>10 BY MR. HEGARTY:</p> <p>11 Q. I'm going to mark as Exhibit</p> <p>12 Number 10 what you just handed to me,</p> <p>13 which is titled "Systematic Review and</p> <p>14 Meta-Analysis of the Association Between</p> <p>15 Perineal Use of Talc and Risk of Ovarian</p> <p>16 Cancer," lead author Taher.</p> <p>17 When did you receive Exhibit</p> <p>18 Number 10?</p> <p>19 MS. O'DELL: Did we skip</p> <p>20 nine?</p> <p>21 MR. HEGARTY: Exhibit 9 is</p> <p>22 the draft screening assessment.</p> <p>23 MS. O'DELL: Okay. I'm</p> <p>24 sorry. I had that as Number 8.</p>
<p style="text-align: right;">Page 59</p> <p>1 that counsel for plaintiffs may have told</p> <p>2 you, do you know how this manuscript</p> <p>3 became available for you to review?</p> <p>4 A. I have no knowledge.</p> <p>5 Q. With regard to the</p> <p>6 Canadian -- sorry, the draft screening</p> <p>7 assessment, did you read the entirety of</p> <p>8 this assessment?</p> <p>9 A. I'm looking for it right</p> <p>10 now.</p> <p>11 Q. Sorry.</p> <p>12 A. Thank you. Except for the</p> <p>13 references, I read the entirety of the</p> <p>14 text.</p> <p>15 Q. Did you pull the references</p> <p>16 and review the references themselves?</p> <p>17 A. No, sir, I did not.</p> <p>18 Q. There are also supplemental</p> <p>19 materials associated with this -- or do</p> <p>20 you know whether there are supplemental</p> <p>21 materials associated with this draft, or</p> <p>22 with this draft screening assessment?</p> <p>23 A. I was also provided a</p> <p>24 document by Dr. Taher. I'm not sure if</p>	<p style="text-align: right;">Page 61</p> <p>1 MR. HEGARTY: Number 8 is</p> <p>2 the manuscript by Dr. Saed.</p> <p>3 MS. O'DELL: Okay. I'm</p> <p>4 sorry.</p> <p>5 BY MR. HEGARTY:</p> <p>6 Q. Going back to my question,</p> <p>7 when did you receive the article by</p> <p>8 Taher?</p> <p>9 A. At the same time that I</p> <p>10 received the health -- the screening</p> <p>11 health assessment from Health Canada.</p> <p>12 Q. Who provided it to you?</p> <p>13 A. Ms. Emmel.</p> <p>14 Q. Did you read the entirety of</p> <p>15 that document?</p> <p>16 A. I read the entirety of this</p> <p>17 document minus the references.</p> <p>18 Q. Did you pull the literature</p> <p>19 cited in the Taher article and review it</p> <p>20 yourself?</p> <p>21 A. I may have looked at</p> <p>22 references that have -- were on the</p> <p>23 reference list of the Saed document, but</p> <p>24 I did not go through each individual</p>

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<p style="text-align: right;">Page 62</p> <p>1 reference in the document and pull it 2 specifically. 3 Q. The Taher article -- strike 4 that. 5 You were provided the Taher 6 article after you completed your expert 7 report in this case, correct? 8 A. That's correct. 9 Q. So it's correct that it did 10 not inform your opinions in your report, 11 correct? 12 A. It informed my opinions -- 13 let me say that it added to my opinions 14 following the writing of my report. It 15 supported my position. 16 Q. Did the assessment conclude 17 that talc use causes ovarian cancer? 18 Strike that. Let me strike that 19 question. We'll come back to that. 20 (Document marked for 21 identification as Exhibit 22 Zelikoff-11.) 23 BY MR. HEGARTY: 24 Q. I'm going to mark next as</p>	<p style="text-align: right;">Page 64</p> <p>1 Q. Have you reviewed any 2 materials since completion of your report 3 for purposes of your work on this case 4 that we have not talked about this 5 morning? 6 A. I reviewed -- since my 7 report, I reviewed Dr. Pier's deposition. 8 Is that what you mean? 9 Q. Dr. Julie Pier's deposition? 10 A. Yes. Three-quarters of it. 11 It is a very long deposition. 12 Q. The second-to-last page of 13 Exhibit Number B under depositions makes 14 reference to depositions and exhibits of 15 Julie Pier dated 9/12 to 9/13/2018. 16 Do you see that? 17 A. Sorry, sir. Fifth line 18 down, deposition/exhibits of Julie Pier. 19 Q. Is that the deposition to 20 which you just referred? 21 A. To the best of my knowledge. 22 Q. Anything else that you have 23 reviewed for purposes of your work on 24 this case that we have not talked about</p>
<p style="text-align: right;">Page 63</p> <p>1 Exhibit Number 11 a copy of the Exhibit C 2 that's referenced in your report. 3 Did you prepare Exhibit 4 Number C? 5 A. If you mean by preparation, 6 did I write it, did I prepare the 7 summary, no, sir I did not. 8 Q. Do you know who prepared it? 9 A. From my reading, it appears 10 as though the attorneys may have prepared 11 it based upon -- to my knowledge, based 12 upon other deponents. 13 Q. Other than the documents 14 that we have talked about that are laid 15 out before us, did you bring any other 16 documents with you to the deposition? 17 A. Other than the documents 18 that are to my right in the folders, the 19 health assessment from the -- the 20 screening health assessment from Canada, 21 Dr. Taher's paper, a letter -- this is in 22 the documents to my right, a letter from 23 Luzenac to Dr. Al Wehner, my CV, the 24 expert report, Exhibit B, my CV, no, sir.</p>	<p style="text-align: right;">Page 65</p> <p>1 this morning or made reference to? 2 A. I reviewed Dr. Hopkins' 3 report. 4 Q. Let me ask it different. 5 Anything that you have reviewed that's 6 either not listed somewhere in your 7 report or we have not marked as an 8 exhibit? 9 A. To the best of my knowledge, 10 no. 11 Q. With regard to Exhibit C, 12 did you review all the documents that are 13 referenced in Exhibit Number C? 14 A. Can I see that, please. 15 Q. I think you still have a 16 copy in front of you. 17 A. Okay. 18 Q. It's Exhibit Number 11, 19 which is marked Exhibit -- which is 20 Exhibit C. Did you actually pull the 21 documents and confirm the accuracy of the 22 information -- 23 A. No, sir. 24 Q. -- contained in Exhibit C?</p>

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<p style="text-align: right;">Page 66</p> <p>1 A. There are no -- there are no 2 references in here, as I understand it. 3 Q. Well, there are Bates 4 numbers -- 5 A. Bates numbers. 6 Q. -- that are listed at the 7 right, which correspond to documents, 8 correct? 9 A. Yes, but when I -- when I 10 hear references I think of citations, 11 papers. 12 Q. Did you actually pull the 13 documents whose Bates numbers are listed 14 and confirm the accuracy of the 15 information contained in Exhibit C? 16 A. I did not pull them as part 17 of reviewing this exhibit, but I have 18 looked at them, because I have gone 19 through all of the production documents. 20 Q. With regard to your expert 21 report in this case, is it correct that 22 you prepared that report -- strike that. 23 With regard to your expert 24 report it defines the scope of your</p>	<p style="text-align: right;">Page 68</p> <p>1 BY MR. HEGARTY: 2 Q. You agree that the standard 3 for proving biologic plausibility or any 4 other scientific issue in the medical 5 literature is the same one that applies 6 in litigation, correct? 7 MS. O'DELL: Object to the 8 form. If you know. 9 THE WITNESS: Can you repeat 10 that, please. 11 BY MR. HEGARTY: 12 Q. Sure. You agree that the 13 standard for proving biologic 14 plausibility or any other scientific 15 issue in a medical literature or in 16 science should be the same that is 17 applied in litigation? 18 MS. O'DELL: Object to the 19 form. 20 THE WITNESS: I will use the 21 same scrutiny and rigor, as I said 22 before. 23 BY MR. HEGARTY: 24 Q. You would -- you intend to</p>
<p style="text-align: right;">Page 67</p> <p>1 testimony in this case, correct? 2 MS. O'DELL: Objection to 3 form. 4 THE WITNESS: Yes, it does. 5 BY MR. HEGARTY: 6 Q. And is it correct that the 7 report was prepared with the same 8 methodology and approach as you would 9 have prepared an article for publication 10 in a scientific journal? 11 A. An article, a grant, a 12 review, an advisory board report, with 13 the same rigor and the same scrutiny, 14 yes. 15 Q. In other words, is it 16 correct that you prepared this report in 17 the same manner as you had prepared all 18 of your articles for publication? 19 MS. O'DELL: Asked and 20 answered. 21 THE WITNESS: I used the 22 same methodology, the same 23 scrutiny and the same rigor to 24 prepare this, yes.</p>	<p style="text-align: right;">Page 69</p> <p>1 apply the same standards to your report 2 and your opinions in this case as you 3 would apply if you were looking at this 4 as simply a professor at New York 5 University? 6 A. Well, I don't see simply a 7 professor. 8 If I were -- I review 9 papers. I think I've answered this 10 already. But I review papers and 11 literature with the same scrutiny as I 12 prepared this report. 13 Q. Did you apply the same 14 standard for assessing biologic 15 plausibility as you apply in your work at 16 NY University? 17 A. I do. 18 Q. Did you sign your report 19 dated November 16, 2018, with the same 20 intent as if signed under penalty of 21 perjury? 22 A. Could you repeat that 23 please. 24 Q. Sure. Did you sign your</p>

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<p>1 expert report dated November 16, 2018, 2 with the same intent as if signed under 3 penalty of perjury? 4 MS. O'DELL: Object to form. 5 THE WITNESS: I'm not sure I 6 understand what that question 7 means. 8 BY MR. HEGARTY: 9 Q. Well, did you -- by signing 10 this report, did you confirm to the 11 accuracy of everything contained in the 12 report? 13 A. To the best of my knowledge, 14 I signed this report knowing that I 15 prepared this report and there is -- with 16 the same intent of accuracy and rigor. 17 Q. You understand this is 18 supposed to be your testimony as if on a 19 stand before a judge or a jury, correct? 20 MS. O'DELL: Object to the 21 form. 22 THE WITNESS: My 23 understanding of the deposition is 24 that it is a legal document and</p>	<p>1 that these are my -- my report 2 reflects my opinion. 3 BY MR. HEGARTY: 4 Q. Are they -- are there any 5 necessary changes, or revisions to your 6 report? 7 A. Not to my knowledge. 8 Q. And all the opinions that 9 you intend to offer in this litigation 10 are set out in your report, as you just 11 said, correct? 12 A. To come to my decision or my 13 opinion, prior to -- included all the 14 documents that I had in my possession and 15 were -- had access to prior to my report. 16 Q. My question is a little bit 17 different, Doctor. My question is, the 18 opinions that you intend to offer as you 19 just indicated, those are set out in your 20 report, correct? 21 A. The opinions that I intend 22 to offer, yes. 23 Q. As your report shows, you 24 don't intend to offer the opinion that</p>
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<p>1 testifying my -- my opinion. And 2 that it has to be honest and 3 truthful and transparent. 4 BY MR. HEGARTY: 5 Q. Well, this time I'm talking 6 about your report. Do you understand 7 your report is supposed to be your 8 testimony as if you are before a judge 9 and a jury? 10 MS. O'DELL: Object to the 11 form. 12 THE WITNESS: I -- I 13 understand that this has to be 14 honest and truthful, and this will 15 be -- could be, will be, the basis 16 for my testimony in a court trial, 17 if that is what you're asking. 18 BY MR. HEGARTY: 19 Q. You understand it's supposed 20 to set out your -- the entirety of your 21 opinions in this case? 22 MS. O'DELL: Object to the 23 form. 24 THE WITNESS: I understand</p>	<p>1 use of Johnson's Baby Powder or Shower to 2 Shower causes ovarian cancer, correct? 3 A. My mission, the question 4 that I was asked by plaintiff attorney 5 was to confer or to assess biological 6 plausibility in the causation of talc for 7 ovarian cancer. 8 Q. And as your report shows, 9 you did not do a risk assessment or 10 Bradford Hill analysis of all the 11 literature looking at talc products and 12 ovarian cancer, correct? 13 A. I think I answered that, but 14 I'm not an epidemiologist, and my -- my 15 question was to look at biological 16 plausibility. 17 Q. And all the materials that 18 you intend to rely upon for purposes of 19 your opinions, are those set out in your 20 report, those we've talked about here 21 this morning, correct? 22 A. Yes, including the 23 contributions that were made after my 24 report including Dr. Longo's supplement,</p>

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<p>1 including Dr. Saed's paper. They added 2 to my opinion, supplemented them. But it 3 is -- but my -- my opinion stays the same 4 as the report. 5 Q. Okay. 6 MR. HEGARTY: The next 7 section I have is pretty long. I 8 don't know if you want to take a 9 quick break now or just keep 10 going. It's up to you. 11 MS. O'DELL: We've been 12 going about an hour. I think 13 that's probably a good idea. 14 MR. HEGARTY: Because 15 otherwise it's not -- there's not 16 going to be a good break time. So 17 we should probably do it now. 18 MS. O'DELL: Well, we can 19 definitely do it now, but we'll -- 20 of course we'll break when the 21 witness needs to break. 22 MR. HEGARTY: Understood. 23 Understood. But you know what I 24 mean.</p>	<p>1 by more than one investigator, and is a 2 compilation of different points, then 3 I -- I will use -- I will not necessarily 4 put quotations around it. And I will not 5 necessarily reference it, because it's -- 6 may have been taken from another document 7 but it's common knowledge. 8 Q. What about -- 9 A. And it's -- 10 Q. I'm sorry. I didn't mean to 11 interrupt. 12 A. I couldn't -- I'm sorry. I 13 couldn't write it any better than as it 14 was put. 15 Q. What about if you take 16 materials from a published article for 17 purposes of your report, did you 18 reference those articles? 19 A. In some cases, not. Again, 20 it's my opinion that if there is 21 something that is stated by an 22 investigator and it's written extremely 23 well, and it's common knowledge for 24 scientists in that area, as well as</p>
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<p>1 MS. O'DELL: Yeah. 2 THE VIDEOGRAPHER: Stand by 3 please. The time is 10:11 a.m. 4 Off the record. 5 (Short break.) 6 THE VIDEOGRAPHER: We are 7 back on the record. The time is 8 10:26 a.m. 9 BY MR. HEGARTY: 10 Q. Dr. Zelikoff, with regard to 11 your expert report, do you have that in 12 front of you? 13 A. I do now. Thank you. 14 Q. We marked that as exhibit 15 what? 16 A. Exhibit 2. 17 Q. With regard to Exhibit 18 Number 2, is it your testimony that all 19 of the sentences in your report are your 20 own words and not copied from others, 21 except where you used quotations? 22 A. Mm-hmm. The way I report 23 and write publications is if something 24 is, I feel, common knowledge or provided</p>	<p>1 others, then I will -- I will use it. 2 Q. That's not how you prepare 3 your report -- that's not how you prepare 4 your articles for journals though, 5 correct? 6 A. No, that's the same way I 7 prepare them. 8 If they are -- if they are, 9 again, common knowledge, I will not 10 necessarily cite them. 11 Q. Is it not your approach that 12 authors are to cite material to which 13 they are relying on or referring to in 14 published articles? 15 A. Again, I think you're asking 16 me the same question. But again, if 17 something is well known, then I do not 18 necessarily reference it. 19 Q. What is the definition -- 20 what is your definition of well known? 21 A. For example, if chromium -- 22 let's use nickel instead. If nickel is 23 being spoken about by IARC, by U.S. EPA, 24 by National Toxicology Program, and</p>

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<p>1 they're all saying the same thing, I in 2 some cases may take what the IARC has 3 said and put it in my reference. 4 Q. And it's your testimony that 5 you do that in all -- you've done that in 6 all the articles that you've ever 7 published? 8 MS. O'DELL: Objection to 9 form. 10 THE WITNESS: I can't say 11 about all the articles. I 12 published over 130 -- 13 MR. HEGARTY: Mark -- 14 THE WITNESS: -- 15 publications and book chapters. 16 (Document marked for 17 identification as Exhibit 18 Zelikoff-12.) 19 BY MR. HEGARTY: 20 Q. Let me mark as Exhibit 21 Number 12 the academic integrity for 22 students at NYU policy. Is this the 23 policy applicable to your university? 24 A. It appears to be that you've</p>	<p>1 Q. Is that not -- is that a 2 definition you agree with? 3 A. I agree that there's ways to 4 interpret that. 5 Q. Is that -- is that the 6 definition New York University applies to 7 its students? 8 A. This sentence, "Presenting 9 others' work without adequate 10 acknowledgment of its source as though it 11 were one's own," that is for students. 12 That is not what I'm doing in my opinion. 13 In my opinion, I'm taking 14 common knowledge and presenting it. 15 Q. Well, they go on to give 16 examples of plagiarism that include, "A 17 sequence of words incorporated without 18 quotation marks." 19 Do you see where I'm 20 reading? 21 A. I do see it. "A sequence of 22 words incorporated without quotation 23 marks." 24 Q. It also says that,</p>
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<p>1 taken it off the website in the academic 2 integrity for students at NYU. 3 Q. If you turn to the second 4 page, there is a definition of 5 plagiarism, that says, "Presenting 6 others' works without adequate 7 acknowledgment of its source as though it 8 were one's own." 9 A. I'm sorry. 10 Q. Do you agree with that 11 definition? 12 A. I'm sorry. What -- 13 Q. Second page of Exhibit 12. 14 A. You mean on the back? Is it 15 under Number 2, Number 1? 16 Q. Number 1. The definition of 17 plagiarism by your university for your 18 students is, "Presenting others' work 19 without adequate acknowledgement of its 20 source as though it were one's own." 21 Do you agree with that -- 22 that definition? 23 A. I agree that there's many 24 different ways to interpret that.</p>	<p>1 "Plagiarism is an unacknowledged passage 2 paraphrased from another's work." 3 Do you see that? 4 A. Some examples of plagiarism, 5 "Unacknowledged passage rephrased from 6 another's work." 7 Q. Do you agree those are -- 8 the two definitions that I just read from 9 your university's own policy for students 10 are examples of plagiarism? 11 A. This is the NYU 12 interpretation or what they've put on the 13 website, yes. 14 Q. Should this be a policy -- 15 strike that. 16 Is this a policy that 17 applies to students at NY university? 18 A. It applies -- it's an 19 academic integrity for students at NYU. 20 Q. Do you agree that professors 21 at NY university should also conform to 22 this policy? 23 A. I believe that honesty, 24 transparency is the key factor for all</p>

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<p>1 scientists at any level. 2 Q. You would agree that this 3 should apply to your work as well, 4 correct? 5 A. I think that this definition 6 is open to interpretation. 7 Q. Well, do you either agree or 8 disagree that this -- well, strike that. 9 Do you agree that this 10 policy should be applied to your work in 11 this case? 12 A. I agree that plagiarism is 13 defined as presenting others' work 14 without adequate acknowledgment of its 15 source as though it were one's own. 16 That's the NYU policy for students. 17 Q. Did you -- you did that in 18 your own report, correct? 19 MS. O'DELL: Object to form. 20 THE WITNESS: I did what in 21 my own report? 22 BY MR. HEGARTY: 23 Q. You plagiarized portions of 24 other people's work without proper</p>	<p>1 Q. Do you know who Shawn Levy 2 is? 3 A. I do not. 4 Q. Did you review Dr. Levy's 5 report for purposes of your -- preparing 6 your report in this case? 7 A. I actually looked at it, but 8 did not -- did not read it. 9 Q. When did you have a chance 10 to look at his expert report? 11 A. I have looked at it -- I'm 12 trying to gather the knowledge. I 13 actually do not recall when I looked at 14 it. 15 Q. If you look at your report 16 on Page 20. In that exhibit, Doctor. 17 A. Oh okay. 18 Q. Your report and the portion 19 of Dr. Levy's report is attached, and if 20 you look at your report Page 20 and his 21 report Page 5 -- 22 MS. O'DELL: I think, Mark, 23 I think there's confusion because 24 there's two documents put together</p>
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<p>1 acknowledgment, correct? 2 MS. O'DELL: Objection to 3 form. 4 THE WITNESS: That is 5 totally incorrect. 6 I used sentences from other 7 people's -- other people's papers 8 because they were common knowledge 9 and contributed by multiple 10 authors. And it was -- 11 BY MR. HEGARTY: 12 Q. I'm going to mark -- sorry. 13 A. And it was stated in a way 14 that I couldn't have stated better. 15 Q. I'm going to mark as 16 Exhibit 13 a report -- a portion of your 17 report dated November 16, 2018. And the 18 back of that is a portion of Rule 26 19 expert report of an expert by the name of 20 Shawn Levy. 21 (Document marked for 22 identification as Exhibit 23 Zelikoff-13.) 24 BY MR. HEGARTY:</p>	<p>1 in this -- 2 MR. HEGARTY: Right. One is 3 her report and one is Levy's 4 report. 5 MS. O'DELL: I just think 6 that that was the confusion. 7 THE WITNESS: Thank you. 8 BY MR. HEGARTY: 9 Q. So the -- do you see that 10 sentences marked as 1 and 2 from 11 Dr. Levy's report are identical to 12 sentences marked 1 and 2 in your report? 13 MS. O'DELL: Object to form. 14 And, Doctor, if you need to 15 take the documents apart and 16 compare them, rather than flipping 17 back and forth, if that would be 18 helpful to you, feel free to do 19 that. 20 THE WITNESS: Good idea. I 21 actually don't recall. Could 22 you -- could you tell me when my 23 report is dated please? 24 BY MR. HEGARTY:</p>

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<p>1 Q. November 16. His report is 2 also dated November 16. 3 A. I did not actually see this 4 report until after mine. 5 However, let me address your 6 question to the best of my ability. 7 "Things stated as both 8 inherited and acquired gene mutations 9 work together to cause cancer." 10 Everyone from the time of 11 their scientific career back in college 12 knows that. 13 "While genetic testing" -- 14 let me make sure I have both -- "both 15 inherited and acquired gene mutations 16 work together to cause cancer." 17 How -- there is no way for 18 me to say that differently. This is a 19 very well statement, very well put 20 statement. I used it without a 21 reference. Even if one -- 22 Q. My question -- I'm sorry. I 23 thought you were finished. 24 A. "Even if one has inherited a</p>	<p>1 from either Dr. Levy's report or from 2 somewhere -- some other source? 3 A. The thoughts are the same. 4 The words seem to be identical. And 5 again, if you interpret that one way and 6 I interpret it another, I certainly do 7 not interpret it as plagiarism. 8 Q. Let me show you another 9 example. 10 (Document marked for 11 identification as Exhibit 12 Zelikoff-14.) 13 BY MR. HEGARTY: 14 Q. I'm going to mark as 15 Exhibit 14, again a portion of your 16 report Page 12 and a portion of a report 17 by Rebecca Smith-Bindman. Do you know 18 who that is? 19 A. Not at all. 20 Q. Did you see her report in 21 this case before preparing your report? 22 A. I never looked at her 23 report. 24 Q. If you would look at the two</p>
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<p>1 genetic mutation that predisposes one's 2 chances, doesn't mean he or she has to 3 get cancer." Again, common knowledge 4 from everyone. 5 Q. Well, Dr. Zelikoff, my 6 question is different than that. 7 My question is, can you 8 explain to us here today, given that you 9 did not see Dr. Levy's report until after 10 you completed your report, how you have 11 several identical sentences between your 12 report and Dr. Levy's report? 13 MS. O'DELL: Object to the 14 form. 15 BY MR. HEGARTY: 16 Q. Dr. Levy's report. 17 A. I cannot -- I -- I don't 18 know. The only -- what I can say is that 19 there was likely a publication. But that 20 is speculation, because I have not looked 21 that over. 22 Q. But is it your testimony 23 here today that the words in your report 24 were solely your own words and not taken</p>	<p>1 reports side by side under the 2 definition -- under the heading 3 Fragrances -- 4 A. I'm sorry, I don't have her 5 report. 6 Q. You have one page of her 7 report in that exhibit. You have the -- 8 the front page and the one page of her 9 report, and you have Page 12 of your 10 report, correct? 11 A. I see. Correct. 12 Q. Do you see that the section 13 under the heading Fragrances is identical 14 between the two reports? 15 A. Yes. They are identical 16 wording. 17 Q. And none of those sentences 18 are common knowledge, correct? 19 MS. O'DELL: Object to the 20 form. 21 THE WITNESS: It's a 22 statement. 23 BY MR. HEGARTY: 24 Q. But it's not common</p>

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<p>1 knowledge, correct, Doctor?</p> <p>2 A. But it's a -- it is -- there</p> <p>3 are more than 150 different chemicals</p> <p>4 added to Johnson's Baby Powder and Shower</p> <p>5 to Shower products. I reviewed the</p> <p>6 expert report from Dr. Crowley that</p> <p>7 concludes that some of these chemicals</p> <p>8 may contribute to the inflammatory</p> <p>9 response, toxicity, and potential</p> <p>10 carcinogenicity. I concur with his</p> <p>11 opinion.</p> <p>12 I say the same thing as</p> <p>13 Dr. Smith-Bindman.</p> <p>14 Q. Is it your testimony that</p> <p>15 you and Dr. Smith-Bindman came to the</p> <p>16 exact same words just by coincidence?</p> <p>17 MS. O'DELL: Object to the</p> <p>18 form.</p> <p>19 THE WITNESS: We came to the</p> <p>20 same conclusions.</p> <p>21 BY MR. HEGARTY:</p> <p>22 Q. That's not my question. My</p> <p>23 question is, is it your testimony here</p> <p>24 today that you and Dr. Smith-Bindman came</p>	<p>1 Q. Sure. Is it your testimony</p> <p>2 that the words in your report under</p> <p>3 section -- under the section Fragrances</p> <p>4 are your words and your words alone from</p> <p>5 no other source?</p> <p>6 MS. O'DELL: Object to the</p> <p>7 form.</p> <p>8 THE WITNESS: I don't quite</p> <p>9 understand what you mean by no</p> <p>10 other source.</p> <p>11 These are my words. They</p> <p>12 confer my opinion.</p> <p>13 BY MR. HEGARTY:</p> <p>14 Q. Well, did you copy those</p> <p>15 words from some source besides</p> <p>16 Smith-Bindman's report?</p> <p>17 A. I did not copy words. I --</p> <p>18 I don't know how this happened.</p> <p>19 If I was in error, I own</p> <p>20 that responsibility.</p> <p>21 (Document marked for</p> <p>22 identification as Exhibit</p> <p>23 Zelikoff-15.)</p> <p>24 BY MR. HEGARTY:</p>
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<p>1 to the exact -- to say the exact same</p> <p>2 thing under the section Fragrance simply</p> <p>3 by coincidence?</p> <p>4 MS. O'DELL: Objection to</p> <p>5 form.</p> <p>6 THE WITNESS: I don't do</p> <p>7 anything usually by coincidence.</p> <p>8 BY MR. HEGARTY:</p> <p>9 Q. Okay. Is it your testimony</p> <p>10 that the words that you wrote under the</p> <p>11 section Fragrances on Page 12 are your</p> <p>12 words and came from nowhere else?</p> <p>13 A. I don't quite understand</p> <p>14 where they could have come from because I</p> <p>15 did not review her report.</p> <p>16 Q. Is it your testimony that</p> <p>17 the words in your report under the</p> <p>18 section Fragrances are your words and</p> <p>19 your words alone from no other source?</p> <p>20 MS. O'DELL: Object to the</p> <p>21 form.</p> <p>22 THE WITNESS: Could you</p> <p>23 please repeat the question?</p> <p>24 BY MR. HEGARTY:</p>	<p>1 Q. I'm going to show you what</p> <p>2 I'm next marking as Exhibit 15.</p> <p>3 MS. O'DELL: Is this one</p> <p>4 exhibit?</p> <p>5 MR. HEGARTY: That's one</p> <p>6 exhibit.</p> <p>7 BY MR. HEGARTY:</p> <p>8 Q. Doctor, Exhibit Number 15 is</p> <p>9 again a portion of your report, and also</p> <p>10 attached to it is a reference from</p> <p>11 Genetics Home Reference dated June 27,</p> <p>12 2017. Do you see both documents?</p> <p>13 A. I do see both documents.</p> <p>14 Q. We have highlighted and</p> <p>15 numbered in Exhibit 15 the portions from</p> <p>16 your report which are taken word for word</p> <p>17 from Genetics Home Reference without a</p> <p>18 single reference to that authority</p> <p>19 anywhere in your report, including in the</p> <p>20 materials considered or reviewed.</p> <p>21 MS. O'DELL: Objection.</p> <p>22 BY MR. HEGARTY:</p> <p>23 Q. Do you see that?</p> <p>24 MS. O'DELL: Objection to</p>

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<p>1 form.</p> <p>2 And -- and, Doctor, take a</p> <p>3 moment to review both, because the</p> <p>4 way this is put together is a</p> <p>5 little confusing.</p> <p>6 THE WITNESS: I see what</p> <p>7 you're referring to.</p> <p>8 BY MR. HEGARTY:</p> <p>9 Q. And did you copy, for</p> <p>10 purposes of your report, without citation</p> <p>11 to this authority, the words that we've</p> <p>12 identified from this reference to Genetic</p> <p>13 Home Reference?</p> <p>14 MS. O'DELL: Objection to</p> <p>15 the form.</p> <p>16 THE WITNESS: So when you</p> <p>17 have things like, "Inherited</p> <p>18 mutations are passed down from</p> <p>19 parent to child and are present</p> <p>20 throughout a person's life in</p> <p>21 virtually in every cell of the</p> <p>22 body." Biology 101, basically,</p> <p>23 where that came from.</p> <p>24 "These mutations are called</p>	<p>1 your report in this case?</p> <p>2 A. I may have used -- it</p> <p>3 appears that I have used the same words.</p> <p>4 And if I did that, which it</p> <p>5 appears that I have, then I've done it</p> <p>6 with the intent to get those same points</p> <p>7 across.</p> <p>8 Q. But you do agree that you</p> <p>9 have included in your report a sequence</p> <p>10 of words incorporated from another source</p> <p>11 without quotation marks, correct?</p> <p>12 MS. O'DELL: Objection to</p> <p>13 form.</p> <p>14 THE WITNESS: I don't use --</p> <p>15 I don't usually use quotation</p> <p>16 marks.</p> <p>17 BY MR. HEGARTY:</p> <p>18 Q. Well, you have used other</p> <p>19 people's words without acknowledging</p> <p>20 where they came from, correct?</p> <p>21 MS. O'DELL: Object to the</p> <p>22 form.</p> <p>23 THE WITNESS: I could have</p> <p>24 used quotation marks. And if I</p>
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<p>1 germ line mutations because</p> <p>2 they're present in the parents'</p> <p>3 egg or sperm, a germ cell."</p> <p>4 Yes, some of these sentences</p> <p>5 appear to be the same as what is</p> <p>6 in here.</p> <p>7 However, again, I stand on</p> <p>8 the fact that all of these -- all</p> <p>9 of my statements are common</p> <p>10 knowledge that have come from</p> <p>11 numerous references. Although the</p> <p>12 words may be the same, the</p> <p>13 thoughts are -- are said as well</p> <p>14 as they can be said.</p> <p>15 BY MR. HEGARTY:</p> <p>16 Q. Dr. Zelikoff, have you ever</p> <p>17 seen this reference to Genetic Home</p> <p>18 Reference before right now?</p> <p>19 A. Not to my knowledge.</p> <p>20 Q. So is it your testimony that</p> <p>21 you did not copy the words from Genetic</p> <p>22 Home Reference that we have highlighted</p> <p>23 that correspond by number to the portions</p> <p>24 in your report for purposes of preparing</p>	<p>1 were to do this over, I would use</p> <p>2 quotation marks.</p> <p>3 BY MR. HEGARTY:</p> <p>4 Q. You're not telling us,</p> <p>5 Doctor, that if you prepared an article</p> <p>6 for publication in a journal, that you</p> <p>7 would take references from another source</p> <p>8 like Genetic Home Reference, include them</p> <p>9 in the article, verbatim, not use</p> <p>10 quotation marks and not reference that</p> <p>11 cite. Is that what you're saying?</p> <p>12 MS. O'DELL: Objection to</p> <p>13 form.</p> <p>14 THE WITNESS: I'm standing</p> <p>15 on my interpretation, and that is</p> <p>16 that in a reference that I would</p> <p>17 prepare in a publication, it would</p> <p>18 be accepted for peer review if</p> <p>19 there was something that I felt</p> <p>20 was common knowledge, that I would</p> <p>21 not reference it.</p> <p>22 To your point, if I had to</p> <p>23 do this over, I would have put</p> <p>24 quotation marks around this.</p>

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<p style="text-align: right;">Page 98</p> <p>1 BY MR. HEGARTY: 2 Q. You would have cited to the 3 authority, as well, from which that -- 4 those passages were lifted, correct? 5 MS. O'DELL: Objection to 6 form. 7 THE WITNESS: I certainly 8 could if that was a concern from 9 the journal or from the reviewer, 10 then I would definitely put in the 11 reference. 12 BY MR. HEGARTY: 13 Q. If a student had prepared 14 this, and you became aware that the 15 student had lifted portions from Genetic 16 Home Reference without any citation, 17 without acknowledging where it came from, 18 would that be okay with you? 19 MS. O'DELL: Objection to 20 form. 21 THE WITNESS: There are -- 22 this is a large document. And in 23 order for something to be copied 24 or, as you put it, plagiarized,</p>	<p style="text-align: right;">Page 100</p> <p>1 will not -- this is the -- what 2 you gave me was an interpretation, 3 was NYU policy, an interpretation 4 of that, which is not the same as 5 mine. 6 BY MR. HEGARTY: 7 Q. Well, you do agree, though, 8 that between the -- your report, the 9 portions taken from your report and the 10 Genetic Home Reference reference are 11 identical? 12 MS. O'DELL: Object to the 13 form. 14 THE WITNESS: I agree that 15 there are sentences that are 16 identical. Yes. 17 BY MR. HEGARTY: 18 Q. You did not acknowledge that 19 source anywhere in your report, correct? 20 A. If you say so. 21 Q. Do you think that's okay to 22 do that? 23 MS. O'DELL: Objection to 24 form.</p>
<p style="text-align: right;">Page 99</p> <p>1 there has to be a certain amount 2 or percentage of the document that 3 has to be the same. 4 And this document, my 5 report, is quite large. So if a 6 student prepared this, and their 7 term paper, for example, was 50 8 pages, I would let them know that 9 if prepared the next time they 10 might want to put in a reference. 11 But I would have to look at 12 the entire size of the document 13 and the percentage of it which had 14 similar -- similar statements and 15 sentences. 16 BY MR. HEGARTY: 17 Q. You do agree that under the 18 policy we marked, we're talking about 19 what you did with regard to this Genetics 20 Home Reference cite, meets the definition 21 of plagiarism? 22 MS. O'DELL: Objection to 23 form. 24 THE WITNESS: I certainly</p>	<p style="text-align: right;">Page 101</p> <p>1 THE WITNESS: If I had not 2 thought it was okay, I would not 3 have done it. 4 BY MR. HEGARTY: 5 Q. Would that -- would that be 6 acceptable for purposes of publishing 7 your report? 8 MS. O'DELL: Objection to 9 the form. 10 THE WITNESS: My opinion 11 stands. And that is my 12 interpretation of what is okay to 13 do based on common knowledge and 14 multiple sources, stands the same. 15 BY MR. HEGARTY: 16 Q. If you were to publish your 17 report, as it is, would you go back and 18 use quotation marks and cite the 19 reference that we just looked at -- 20 A. If I had -- 21 Q. -- Exhibit Number 16? 22 MS. O'DELL: Excuse me, 23 Doctor. Just let him finish. 24 THE WITNESS: Of course.</p>

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<p>1 I'm sorry. 2 MS. O'DELL: Thank you. And 3 just give me a moment to object. 4 Thank you. 5 BY MR. HEGARTY: 6 Q. Did you hear my question? 7 A. Could you repeat your 8 question, please? 9 Q. Sure. If you were to 10 publish a report as it is, would you go 11 back and use quotation marks and cite the 12 reference that we just looked at in 13 Exhibit Number 16? 14 A. Now that you've pointed out 15 your interpretation of it, I would 16 certainly consider that. 17 (Document marked for 18 identification as Exhibit 19 Zelikoff-16.) 20 BY MR. HEGARTY: 21 Q. Let me show you what I'm 22 next marking as Exhibit Number 16. 23 MS. O'DELL: I'll reach 24 over, instead of you throwing it.</p>	<p>1 increased release of ROS." 2 That is a very common -- 3 commonly known point. 4 BY MR. HEGARTY: 5 Q. How about Point Number 4 in 6 the abstract? 7 A. As -- 8 Q. That's -- is it your 9 testimony that Point Number 4 in the 10 abstract is what you consider common 11 knowledge? 12 A. "Activation of the 13 transcription factors can lead to the 14 expression of over 500 genes, including 15 more for growth factors." And I'm going 16 to read the entire abstract. 17 Actually this is a review 18 paper. And this is not a unique finding 19 to this particular author. 20 And thus "Activation of 21 transcription factors," again as I read, 22 is an outcome of many, many authors. And 23 as I said, is a review paper, not a 24 unique investigator-initiated outcome.</p>
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<p>1 BY MR. HEGARTY: 2 Q. This is another portion of 3 your report which we've correspondingly 4 referenced to an article by Simone 5 Reuter. And you can see where we've 6 identified six different times where 7 sentences have been copied verbatim from 8 this article without any quotation or any 9 acknowledgment of its -- of the source. 10 Do you see that? 11 MS. O'DELL: Object -- 12 excuse me. Object to the form. 13 Feel free to review it, the 14 reference or the exhibit. There 15 are two things paper clipped 16 together, if you need to look at 17 it in more detail. 18 THE WITNESS: Again, there 19 are sentences such as, "During 20 inflammation macrophages, mast 21 cells, and neutrophils were 22 recruited at the site of damage, 23 leads to a respiratory burst and 24 increased uptake of oxygen, and an</p>	<p>1 Q. You keep referring to common 2 knowledge. Who is -- who has this common 3 knowledge? 4 A. People who read scientific 5 journals. 6 Q. So is it your testimony that 7 someone who would read your report would 8 understand that that is not -- those are 9 not your words but taken from 10 somewhere -- somewhere else? 11 MS. O'DELL: Object to the 12 form. 13 THE WITNESS: It would 14 depend upon who is reading it. 15 BY MR. HEGARTY: 16 Q. Can you cite for me any 17 publication that you have ever written 18 where you have cited another authority 19 word for word and did not use quotation 20 marks and did not reference that 21 authority? 22 A. Not off the top of my head. 23 Q. But you did do that in your 24 expert report in this case, correct?</p>

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<p style="text-align: right;">Page 106</p> <p>1 MS. O'DELL: Object to the 2 form. 3 THE WITNESS: It appears 4 from what you're showing me, that 5 in my interpretation of common 6 knowledge and multiple -- multiple 7 investigators, I have done that, 8 yes. 9 (Document marked for 10 identification as Exhibit 11 Zelikoff-17.) 12 BY MR. HEGARTY: 13 Q. I'm going to mark next 14 Exhibit Number 17, another portion of 15 your report where you, again, take 16 sentences from a publication called 17 EnvironmentalChemistry.com. 18 You cite them word for word 19 in your report and you make no reference 20 anywhere in your report to this 21 authority. 22 A. I said -- 23 MS. O'DELL: Excuse me. 24 Excuse Me, Doctor. Excuse me.</p>	<p style="text-align: right;">Page 108</p> <p>1 MS. O'DELL: Object to the 2 form. 3 THE WITNESS: Yes, I see 4 what you're saying. 5 BY MR. HEGARTY: 6 Q. And nowhere in your report 7 do you give acknowledgment to 8 EnvironmentalChemistry.com as a source of 9 the information that you copied, correct? 10 MS. O'DELL: Object to the 11 form. 12 THE WITNESS: I do say the 13 U.S. EPA defines asbestos by 14 limiting the term to six specific 15 fibrous minerals from two distinct 16 groups. And I go on from there. 17 That is a referral to the U.S. 18 EPA. 19 BY MR. HEGARTY: 20 Q. Doctor, nowhere in your 21 report, in those notebooks or anywhere do 22 you cite to EnvironmentalChemistry.com, 23 do you? 24 MS. O'DELL: Object. Object</p>
<p style="text-align: right;">Page 107</p> <p>1 MR. HEGARTY: I'm not 2 finished with my question. 3 MS. O'DELL: I thought you 4 were finished with your question. 5 MR. HEGARTY: Because I just 6 made a statement. 7 MS. O'DELL: Well, I object 8 to the statement. You ask your 9 question, and I'll probably object 10 to that. 11 But give me a chance, the 12 two of you, please. 13 BY MR. HEGARTY: 14 Q. Let me -- Doctor, this -- 15 the reference that we have here in the 16 Exhibit Number 17 is to a website called 17 EnvironmentalChemistry.com. Did you 18 review this website in preparing your 19 report? 20 A. I don't recall. 21 Q. Do you see where we make 22 reference to five different places where 23 you copied word for word from 24 EnvironmentalChemistry.com?</p>	<p style="text-align: right;">Page 109</p> <p>1 to the form. 2 THE WITNESS: Not to my 3 knowledge. 4 EnvironmentalChemistry.com, I 5 don't even recall reviewing it. 6 BY MR. HEGARTY: 7 Q. But don't you agree that you 8 would have had to review it based on the 9 fact that there are identical sentences 10 taken from -- that are identical 11 sentences, in Environmental Chemistry and 12 in your report? 13 MS. O'DELL: Object to the 14 form. 15 THE WITNESS: This -- again, 16 this information is common 17 knowledge. This is not a creation 18 of EnvironmentalChemistry.com. 19 They are not an individual 20 investigator finding this data. 21 They are reporting this data on 22 the internet for people's review. 23 BY MR. HEGARTY: 24 Q. Is</p>

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<p style="text-align: right;">Page 110</p> <p>1 EnvironmentalChemistry.com a reliable 2 authority? 3 MS. O'DELL: Object to the 4 form. 5 THE WITNESS: I have no 6 idea -- sorry. 7 MS. O'DELL: Go ahead. 8 THE WITNESS: I have no idea 9 of the impact factor or the 10 reliability of this. However, in 11 talking about this, and saying the 12 things that I -- that you have 13 said I have used identically, 14 which appear to be the case -- 15 "while amphibole and serpentine 16 asbestos may have fibrous habits, 17 they have very different forms. 18 Amphibole are double-chain 19 silicates." 20 This is known in the 21 asbestos -- in the asbestos 22 literature. And the basic 23 structural unit is silicone oxide. 24 This is not Environmental</p>	<p style="text-align: right;">Page 112</p> <p>1 published methodology which says that 2 your interpretation of what you are to 3 quote and what you are to cite in an 4 article is an accepted methodology in 5 publishing scientific literature? 6 A. It's my professional opinion 7 after 30 years of work. 8 Q. Well, can you cite for me 9 any published authority that says your 10 definition of what you are to cite and 11 what you are to reference is the 12 definition that's applicable to medical 13 literature? 14 MS. O'DELL: Objection to 15 form. 16 THE WITNESS: I have never 17 been accused or cited by any 18 publication in any of my 135 19 papers or my over 30 book chapters 20 of having anything that was of a 21 dubious nature, ever. 22 BY MR. HEGARTY: 23 Q. That's not my question. My 24 question was can you cite for me any</p>
<p style="text-align: right;">Page 111</p> <p>1 Chemistry's individual 2 investigator initiated. 3 I think you may be confusing 4 an individual paper where an 5 investigator sits down in the 6 laboratory and works out or comes 7 up with a fact and that it's his. 8 As opposed to data that's just out 9 there in the internet, out there 10 in the world, out there in book 11 chapters, out there everywhere, 12 that people know. 13 This is not an investigator 14 initiated, whether it's 15 EnvironmentalChemistry.com. 16 So I will -- I will say to 17 you that in many cases, I did use 18 the same sentence. Certainly 19 EnvironmentalChemistry.com is not 20 an investigator-initiated point of 21 reference. It's just facts that 22 are supported by other experts. 23 BY MR. HEGARTY: 24 Q. Can you cite for me any</p>	<p style="text-align: right;">Page 113</p> <p>1 written authority that says that in 2 publishing medical literature, if you're 3 citing what you call general knowledge 4 word for word from another source, you 5 don't have to quote it and you do not 6 have to give it any reference. 7 A. Just my professional opinion 8 of 30 years of work. 9 Q. Okay. And in a -- and 10 you've never done that in any medical 11 article you -- any article you have 12 published, correct? 13 A. I cannot -- I cannot speak 14 to all. 15 Q. Well, if you were to write a 16 medical article -- a scientific article 17 today, and you were to quote something 18 from -- take something word for word from 19 EnvironmentalChemistry.com, is it your 20 testimony you wouldn't give any reference 21 to it or wouldn't use quotation marks? 22 MS. O'DELL: Object to the 23 form. 24 THE WITNESS: I -- I stand</p>

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<p>1 on the opinion that I have, that</p> <p>2 it would be common knowledge.</p> <p>3 BY MR. HEGARTY:</p> <p>4 Q. That's not my question. My</p> <p>5 question is if you were to write an</p> <p>6 article today and you were to cite</p> <p>7 Environmental.com word for word, is it</p> <p>8 your testimony you would not quote</p> <p>9 that -- those words or give any reference</p> <p>10 or acknowledgment to environmental --</p> <p>11 to --</p> <p>12 A. EnvironmentalChemistry.com.</p> <p>13 Q. EnvironmentalChemistry.com?</p> <p>14 MS. O'DELL: Object to the</p> <p>15 form.</p> <p>16 THE WITNESS: I would do the</p> <p>17 same thing I've done for this</p> <p>18 report.</p> <p>19 BY MR. HEGARTY:</p> <p>20 Q. Okay. And is that true for</p> <p>21 every resource that we've looked at so</p> <p>22 far? You would -- if you were to write a</p> <p>23 scientific journal today, you would --</p> <p>24 and quoted from all those resources, you</p>	<p>1 that you have copied verbatim from that</p> <p>2 publication without giving any</p> <p>3 acknowledgment to Dr. Rakoff-Nahoum or</p> <p>4 use any quotation marks. Do you see</p> <p>5 that?</p> <p>6 MS. O'DELL: Object to the</p> <p>7 form.</p> <p>8 THE WITNESS: So on Page 124</p> <p>9 of the review by Seth</p> <p>10 Rakoff-Nahoum -- Nahoum, if you</p> <p>11 look on -- under cancer and</p> <p>12 inflammation, and one of the</p> <p>13 points that you make here -- and</p> <p>14 by the way, this is a review</p> <p>15 paper, again not an independent</p> <p>16 investigator-initiated data from</p> <p>17 the laboratory -- "Epidemiological</p> <p>18 evidence points to a connection</p> <p>19 between inflammation and" -- "and</p> <p>20 predisposition for the development</p> <p>21 of cancer, i.e., long-term</p> <p>22 inflammation leads to the</p> <p>23 development of dysplasia," there's</p> <p>24 no reference there.</p>
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<p>1 would not use quotation marks and you</p> <p>2 would not give any acknowledgment in</p> <p>3 any -- if you were to write a scientific</p> <p>4 article today?</p> <p>5 MS. O'DELL: Object to form.</p> <p>6 Misstates her testimony.</p> <p>7 THE WITNESS: I -- I did say</p> <p>8 that there are certain cases that</p> <p>9 if I had to do it over and based</p> <p>10 upon your rigorous opinion of</p> <p>11 this, that I would place quotation</p> <p>12 marks or add a reference, yes.</p> <p>13 (Document marked for</p> <p>14 identification as Exhibit</p> <p>15 Zelikoff-18.)</p> <p>16 BY MR. HEGARTY:</p> <p>17 Q. I'm going to show you what</p> <p>18 I'm next marking as Exhibit 18.</p> <p>19 This is another portion of</p> <p>20 your report. In addition to that</p> <p>21 exhibit -- or with that exhibit is a</p> <p>22 reference to a publication by</p> <p>23 Rakoff-Nahoum, where you again made</p> <p>24 references to four different sentences</p>	<p>1 So this author also,</p> <p>2 Dr. Rakoff-Nahoum -- sorry, I'm</p> <p>3 murdering his name -- also gives</p> <p>4 no reference to that.</p> <p>5 Again, in this case, using</p> <p>6 my analogy of something that has</p> <p>7 been gathered by numerous other</p> <p>8 investigators and is common</p> <p>9 knowledge to the -- to the</p> <p>10 scientific population, he did also</p> <p>11 not use a reference. And I did</p> <p>12 not use a reference.</p> <p>13 BY MR. HEGARTY:</p> <p>14 Q. But if -- but if you look at</p> <p>15 his -- the last reference, Number 4, he</p> <p>16 does acknowledge a resource for all of</p> <p>17 those statements, Resource 20 in the</p> <p>18 publication, correct?</p> <p>19 MS. O'DELL: Objection.</p> <p>20 Could you provide, if you're</p> <p>21 going to use this exhibit, provide</p> <p>22 the full manuscript that</p> <p>23 identifies Resource 20.</p> <p>24 (Document marked for</p>

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<p style="text-align: right;">Page 118</p> <p>1 identification as Exhibit 2 Zelikoff-20.) 3 BY MR. HEGARTY: 4 Q. I'll mark as 20, the 5 entirety of the Rakoff-Nahoum article, 6 which does include 20, which is a 7 reference to Hussain, "Radical Causes of 8 Cancer." 9 A. Citation 20 in Exhibit 20 is 10 also a review paper, and none of these 11 references are going back to the 12 independent investigator who actually 13 said this. 14 So these are reviewed in. 15 Again, standing by my opinion that 16 oftentimes in review articles which -- 17 in -- in review articles, they often take 18 the liberty, as seen in your first point, 19 that you do not use a reference. 20 Now, I would have to read 21 Reference 20 in order to see whether 22 that, in fact, reviews Points 2, 3 and 4 23 in your "Why Cancer and Inflammation" 24 paper.</p>	<p style="text-align: right;">Page 120</p> <p>1 publication by OSHA for purposes of your 2 report. Do you see that? 3 MS. O'DELL: Objection to 4 form. 5 THE WITNESS: I do see what 6 you're pointing to. I also will 7 tell you that Point 1 that you 8 point out in the OSHA United 9 States Department of Labor, on 10 hexavalent chromium, which is off 11 the internet, adverse health 12 effects associated, yes, I used 13 adverse health -- health effects 14 other than cancer, and then I had 15 these different words. 16 I'm just explaining what I 17 see. 18 With chromium-6, hexavalent 19 chromium exposure include 20 occupational asthma, eye 21 irritation and damage, perforated 22 ear drums, et cetera, et cetera. 23 This can be found in numerous, 24 numerous references. This again</p>
<p style="text-align: right;">Page 119</p> <p>1 I do not know that 2 Reference 20 actually reviews all of 3 these points and are the reference. 4 Also, many of these 5 points -- and again, another review 6 paper. 7 Many of these points, the 8 chronic inflammatory states associated 9 with infection, irritation, may lead to 10 environments that foster genomic lesions 11 in tumor initiation, no reference there. 12 One effect and mechanism, et 13 cetera, et cetera. Hydroxyl radicals, 14 reactive oxygen species, no reference 15 there. No quotation marks. 16 So I don't know whether he, 17 in fact, uses the same logic that I did. 18 (Document marked for 19 identification as Exhibit 20 Zelikoff-19.) 21 BY MR. HEGARTY: 22 Q. I'm going to show you 23 Exhibit 19. This is another reference 24 where you copied portions of a</p>	<p style="text-align: right;">Page 121</p> <p>1 is common knowledge for anyone 2 doing chromium -- chromium 3 studies. 4 Again, did I use the same 5 words? In many cases, I did here. 6 "Can also develop an 7 allergic skin reaction called 8 allergic contact dermatitis." I'm 9 not quite sure how else you can 10 say that, that phrase. 11 So I still feel confident in 12 what I did was based upon my 13 professional judgment. 14 (Document marked for 15 identification as Exhibit 16 Zelikoff-21.) 17 BY MR. HEGARTY: 18 Q. Okay. I'll show you what I 19 next marked as Exhibit 21. Exhibit 21 is 20 again a portion of your report where we 21 have identified statements that are taken 22 verbatim without acknowledgment from the 23 publication attached thereto by Kasprzak. 24 A. Kasprzak. I'm sorry, sir.</p>

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<p>1 MS. O'DELL: Did you finish 2 your question? 3 BY MR. HEGARTY: 4 Q. No. Do you see where I'm 5 talk -- do you see where I'm referencing? 6 MS. O'DELL: Object to form. 7 THE WITNESS: I -- 8 MS. O'DELL: Take a moment 9 if you need to, Doctor. 10 THE WITNESS: So what I see 11 in the abstract of a paper, a 12 review paper called Nickel 13 Carcinogenesis by Kasprzak and 14 Sunderman and Konstantine 15 Salnikow, you say -- you're 16 pointing to, "The exact mechanisms 17 of nickel-induced carcinogenesis 18 are not known and have been 19 subject of numerous 20 epidemiological and experimental 21 investigations." 22 That is not -- that -- okay. 23 And what's in my paper is, "The 24 exact mechanisms of nickel-induced</p>	<p>1 risks are primarily related to 2 exposure to soluble nickel 3 concentrations," et cetera, et 4 cetera. 5 But in many cases throughout 6 this reference, I can also -- it 7 being a review paper, I can also 8 tell you there's epidemiological 9 evidence on possible cancer risk 10 from general environment and 11 dietary nickel exposures not cited 12 as a reference, not quoted. 13 BY MR. HEGARTY: 14 Q. Are you finished? 15 A. I am, thank you. 16 THE WITNESS: Excuse me. 17 May I just point out that it's 18 getting even colder in here and 19 I'm a bit uncomfortable. 20 (Whereupon, a discussion was 21 held off the record.) 22 THE WITNESS: May I go get 23 my scarf? 24 MR. HEGARTY: Off the</p>
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<p>1 cainogenesis are not known but 2 likely involve genetic and 3 epigenetic routes." 4 That's not the same as this 5 sentence. It has portions of the 6 same, but not the entire sentence 7 is the same. 8 "Are likely to evolve 9 genetic and epigenetic routes." 10 Not quite sure how else you would 11 say this. 12 And this again is a review 13 paper. And going through it, here 14 I can cite a sentence. 15 "Occupational exposure to nickel 16 occurs predominately in mining, 17 refining, alloy production, 18 electroplating, and welding." 19 This is in the review by Kasprzak. 20 There's no reference there either. 21 In this sentence, "In 1990 22 the International Committee on 23 Nickel Carcinogenesis in Man 24 suggested that respiratory cancer</p>	<p>1 record. 2 THE VIDEOGRAPHER: The time 3 is 11:11 a.m. Off the record. 4 (Short break.) 5 THE VIDEOGRAPHER: The time 6 is 11:23 a.m. Back on record. 7 (Documents marked for 8 identification as Exhibits 9 Zelikoff-25 through 32.) 10 MR. HEGARTY: We're back on 11 the record. I'm going to mark -- 12 I've marked as Exhibits 25 through 13 32, other examples taken from 14 Dr. Zelikoff's report where -- 15 along with the references to which 16 they were taken. And I'm just 17 going to mark those for purposes 18 of the deposition as those 19 exhibits. 20 MS. O'DELL: What's the 21 exhibit number? 22 MR. HEGARTY: Exhibits 25 23 through 32, and I did skip over 24 through 22 through 24, but I'll</p>

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<p>1 come back to it. So we did get 2 kind of out of order in the way I 3 marked those. 4 MS. O'DELL: So plaintiff 5 objects to the Exhibit 25 through 6 32 being added to the record. 7 There's no testimony from 8 Dr. Zelikoff. So any assertion 9 that counsel has made that those 10 are relevant, we would object 11 and -- and oppose their being 12 included. 13 BY MR. HEGARTY: 14 Q. Doctor, if you would look at 15 your report which is Exhibit Number 2. 16 A. Yes, sir. 17 Q. On Page 2 of your report, 18 under the section Mandate and 19 Methodology? 20 A. Yes, sir, I see it. 21 Q. You say your mandate was to 22 look at the scientific literature and 23 assess whether there is biologic 24 plausibility for talc to cause ovarian</p>	<p>1 A. That was my -- that was -- 2 the request was to assess biological 3 plausibility. 4 Q. You say in that portion that 5 we just reviewed that -- you say for the 6 increased risk of ovarian cancer with 7 talc use. Did you assume for purposes of 8 your report that there is, in fact, an 9 increased risk of ovarian cancer with 10 talc use? 11 A. I'm sorry, sir, can you tell 12 me exactly which paragraph? 13 Q. In the first paragraph under 14 the section Mandate and Methodology, you 15 say "assess whether there is biologic 16 plausibility" -- "biologically plausible 17 explanation for the increased risk of 18 ovarian cancer with the perineal use of 19 talcum powder products." 20 Do you see that? See where 21 I'm reading? 22 A. I am sorry, sir, I do not. 23 Q. First paragraph under 24 page -- on Page 2 under mandate and</p>
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<p>1 cancer from perineal use; is that 2 correct? 3 MR. GOLOMB: I'm sorry. 4 What page are you on? 5 MR. HEGARTY: Page 2. 6 THE WITNESS: Are you done? 7 BY MR. HEGARTY: 8 Q. Yes. 9 A. My mandate was to review the 10 scientific literature and assess whether 11 there was biological plausible 12 explanation for the increased risk of 13 ovarian cancer with perineal use of 14 talcum powder products, yes, that is 15 correct. 16 Q. Who gave you that mandate? 17 A. That was the plaintiff 18 attorney, Ms. Emory [sic] and Ms. O'Dell. 19 Q. You say -- 20 A. They -- I -- but let me add 21 they -- when you say gave me that 22 mandate, can you explain what you mean by 23 gave me that mandate? 24 Q. Well, from --</p>	<p>1 methodology. 2 A. Is that the notion of 3 biological plausibility paragraph, or are 4 you -- 5 Q. It's the first paragraph 6 under the section Mandate and 7 Methodology. 8 A. Well, sir, there are two, 9 two paragraphs. One says mandate. I was 10 asked to review the scientific 11 literature. Then there is another 12 paragraph that says the notion of 13 biological plausibility is 14 multifactorial. 15 Q. Doctor, if you'd listen to 16 my question. I said the first paragraph 17 under mandate and methodology. Do you 18 understand that? 19 A. I do not -- I do not see it 20 and you can -- 21 Q. You don't see the first 22 paragraph that begins mandate? 23 A. I just read that to you, 24 sir.</p>

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<p style="text-align: right;">Page 130</p> <p>1 Q. And -- and you understand 2 that's the first paragraph of -- under 3 the section Mandate and Methodology? 4 A. Under mandate it says, "I 5 was asked to review the scientific 6 literature and assess whether there is 7 biological plausible explanation for the 8 increased risk of ovarian cancer and the 9 perineal use of talcum powder products." 10 Q. And for purposes of your 11 mandate, did you assume that there was, 12 in fact, an increased risk of ovarian 13 cancer with the perineal use of talcum 14 powder? 15 A. I made no assumptions. 16 Q. Did you individually assess 17 whether there is an increased risk of 18 ovarian cancer with the perineal use of 19 talcum powder products? 20 A. Could you please slow down? 21 You are asking the question very quickly. 22 Q. Okay. Did you 23 individually -- did you do an analysis of 24 whether there's an increased risk of</p>	<p style="text-align: right;">Page 132</p> <p>1 Q. What graduate students 2 assisted you? 3 A. Are you asking me for their 4 names? 5 Q. Yes. 6 A. Nick Lawrence who was a 7 master student. And Catherine Fecchi who 8 was my master student. Both of them have 9 which graduated. 10 Q. Did you bill plaintiffs' 11 counsel for their time? 12 A. I paid them out of my 13 pocket. 14 Q. And how much did you pay 15 them per hour? 16 A. \$25 per hour. 17 Q. Do you describe -- strike 18 that. 19 Anyone else assist you with 20 your literature search? 21 A. I'm sorry, anyone else? 22 Q. Assist you in your 23 independent comprehensive literature 24 review.</p>
<p style="text-align: right;">Page 131</p> <p>1 ovarian cancer with perineal use of 2 talcum powder products? 3 A. No. As you can see by the 4 mandate I was asked to assess the 5 biological plausibility. I did no 6 analysis of causation. 7 Q. You did no analysis of 8 whether there is, in fact, an increased 9 risk of ovarian cancer with the perineal 10 use of talcum powder products? 11 A. I did no analysis of 12 causation. I'm not an epidemiologist. 13 Q. You also discuss in the 14 third paragraph, which begins "I 15 performed an independent comprehensive 16 literature review." 17 A. I see that, yes. Thank you. 18 Q. That you did do a literature 19 search, correct? 20 A. I did do a literature 21 search, correct. 22 Q. Did you do this yourself? 23 A. I did do this myself along 24 with several graduate students.</p>	<p style="text-align: right;">Page 133</p> <p>1 A. No, sir. 2 Q. So doing the searches was 3 part of your methodology for preparing 4 your report, correct? 5 A. Doing the searches were my 6 initial, my initial, yes. 7 Q. Did you prepare in advance a 8 written protocol on how you were going to 9 do the searches? 10 A. I followed the same protocol 11 that I used for papers, publications, 12 advisory boards, grant -- grant reviews 13 and grants that I write. 14 Q. That's not my question. My 15 question is, did you prepare a written 16 protocol as far as how you were going to 17 do the literature review for purposes of 18 your report? 19 A. I did not do a written 20 outline as to how to do this. I've been 21 doing this for over 35 years. 22 Q. You agree that it was part 23 of your methodology is -- for your 24 literature search, to find and review all</p>

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<p>1 literature that touch on talc and its 2 biologic effects, correct? 3 MS. O'DELL: Object to the 4 form. 5 THE WITNESS: My purpose was 6 to examine the literature, assess 7 the literature, first identify the 8 literature that I felt was -- 9 well, all -- all the literature 10 that I could find or that the 11 students could find, and from me 12 to review them in terms of 13 relevancy and pertinence to the 14 question that I was being asked. 15 BY MR. HEGARTY: 16 Q. Did you do any testing of 17 your methodology of doing searches to 18 ensure that you had captured all the 19 relevant literature? 20 MS. O'DELL: Object to the 21 form. 22 THE WITNESS: What do you 23 mean by testing? 24 BY MR. HEGARTY:</p>	<p>1 reviewed all of the literature out 2 there. I have no way of knowing 3 that I reviewed or have not. 4 I gathered the literature in 5 a systematic fashion and I 6 reviewed that literature. 7 BY MR. HEGARTY: 8 Q. Did you read every paper 9 that you found from your literature 10 search? 11 A. Only those that were 12 relevant. I read the abstracts to 13 determine whether it was in fact related 14 to the question that I was being asked. 15 When you do a literature 16 search, you come up with things that are 17 related and some that are not related at 18 all. 19 Q. Does your report anywhere 20 describe or include a description of how 21 you weighed the various authorities that 22 you reviewed? 23 A. My report talks about under 24 mandate and methodology how I -- the last</p>
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<p>1 Q. Well, I don't know. Did you 2 do any tests, having someone else do 3 searches, repeating the searches, to see 4 if your original searches captured all of 5 the relevant literature? 6 A. We did several searches 7 doing -- using different words and 8 different aspects, so that we could -- we 9 got numerous duplicates because we came 10 in with different words, and key -- 11 keywords and key phrases. 12 Q. You do agree that it would 13 be necessary for a proper methodology to 14 reach opinions about biologic 15 plausibility, that you have reviewed all 16 the pertinent literature, correct? 17 MS. O'DELL: Object to the 18 form. 19 THE WITNESS: To my 20 knowledge I reviewed the 21 literature that was pertinent to 22 the question that I was being 23 asked. 24 I am not stating that I</p>	<p>1 paragraph, and that begins more than 300 2 publications, will -- talks about how 3 I -- how I looked at the publications and 4 how I decided how to cut down or dismiss 5 certain papers based on a closer 6 scrutiny. And I focused specifically for 7 biological plausibility and being a 8 toxicologist on in vitro, in vivo, and ex 9 vivo studies as well as cell studies, 10 animal studies, and tissues. 11 Q. Did you assign any numerical 12 value to each authority as they relate to 13 the importance to you? 14 A. I did not assign any 15 numerical value. There was no 16 quantitative measurement done. 17 Q. Was it also part of your 18 methodology to review all expert reports 19 in the litigation that concerned biologic 20 plausibility? 21 MS. O'DELL: Object to the 22 form. 23 THE WITNESS: Can you ask me 24 that again, please.</p>

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<p>1 BY MR. HEGARTY: 2 Q. Sure. Was it part of your 3 methodology to review all expert reports 4 in the litigation concerning biologic 5 plausibility? 6 A. I -- I looked at reports 7 that had relevancy in terms of animal 8 models, in vitro cultures or ex vivo 9 studies, yes. My opinion was formed 10 primarily by the publications and the 11 science that I reviewed. 12 Q. Was it part of your 13 methodology for purposes of your opinions 14 to review the expert witness reports from 15 the litigation that touch on biologic 16 plausibility? 17 MS. O'DELL: Object to the 18 form. Asked and answered. 19 THE WITNESS: I reviewed the 20 publications and the book chapters 21 and information that I thought 22 would go towards my -- my opinion. 23 BY MR. HEGARTY: 24 Q. Your expert report, as we</p>	<p>1 THE WITNESS: To my 2 knowledge, I have no knowledge as 3 to how they selected the reports 4 or which reports they selected to 5 send. 6 BY MR. HEGARTY: 7 Q. You didn't have -- get a 8 list of all expert reports and decide 9 which ones you wanted, correct? 10 MS. O'DELL: Object to the 11 form. 12 THE WITNESS: I -- no. I 13 did not get a list of an entirety. 14 BY MR. HEGARTY: 15 Q. Do you know plaintiffs' 16 counsel methodology for purposes of 17 selecting the reports to provide to you? 18 A. I do not know their 19 methodology, but I would guess since 20 papers were supplied to me that had both 21 opinions and conclusions that led to 22 either positive associations or lack of 23 positive or data from scientific in vivo 24 studies, et cetera, that showed effects</p>
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<p>1 have looked at, includes references to 2 several other experts' reports, correct? 3 We looked at that earlier. 4 A. If you say so, yes. 5 Q. Did you select those expert 6 reports for purposes of your review? 7 MS. O'DELL: Object to the 8 form. 9 THE WITNESS: I formed my 10 opinion with contributions from 11 some of the reports that I had. 12 But it was primarily based upon 13 literature reviews. 14 BY MR. HEGARTY: 15 Q. The reports that you had 16 were provided to you by plaintiffs' 17 counsel, correct? 18 A. Reports that I received was 19 supplied to me by plaintiffs' counsel. 20 Q. They selected the reports 21 that they were going to provide to you, 22 correct? 23 MS. O'DELL: Object to the 24 form.</p>	<p>1 and no effects, I would assume that I got 2 all the literature both -- from both 3 perceptions. 4 Q. Can you identify any medical 5 literature that you had reviewed prior to 6 being contacted by Ms. Emmel? 7 A. Medical literature on? 8 Q. Let me finish my question. 9 A. I'm sorry. 10 Q. Can you identify any 11 scientific or medical literature that you 12 reviewed before being contacted by 13 Ms. Emmel concerning talc and ovarian 14 cancer? 15 A. There is no literature that 16 I reviewed prior to me being contacted by 17 Ms. Emmel. 18 Q. Also in Exhibit B -- 19 A. B as in boy? 20 Q. -- boy -- to your report. 21 There is a listing of produced documents 22 by Bates number. 23 A. Correct. I see it, 24 "materials and data considered."</p>

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<p>1 Q. Did the plaintiffs' counsel 2 provide you with copies of those 3 documents? 4 A. I have not gone through 5 every paper in those multiple binders. I 6 would assume that many of them are in 7 there. 8 Q. That's not my question, 9 Doctor. My question was, were those 10 documents provided to you by counsel for 11 plaintiffs? 12 MS. O'DELL: What documents 13 are you referring to? 14 MR. HEGARTY: The documents 15 that are listed by Bates number in 16 Exhibit B. 17 THE WITNESS: Oh, you're 18 talking about produced documents? 19 BY MR. HEGARTY: 20 Q. Yes. 21 A. Repeat your question, 22 please. 23 Q. Sure. Were the documents 24 listed by Bates number under produced</p>	<p>1 section "produced documents"? 2 A. I reviewed all of the 3 documents that are in the binder listed 4 as production documents. I did not check 5 one for another, so I cannot say I did 6 all of these -- 7 Q. Did you receive -- 8 A. -- or they did not. 9 Q. I'm sorry. Did you receive 10 from counsel from plaintiffs all the 11 documents that have been produced in this 12 litigation that concerned biologic 13 plausibility? 14 MS. O'DELL: Object to the 15 form. 16 THE WITNESS: I have no 17 knowledge of whether I received 18 every single document there is out 19 there. 20 BY MR. HEGARTY: 21 Q. Did you ask for -- did you 22 ask counsel for plaintiffs to provide you 23 all the documents that have been produced 24 in this case concerning biologic</p>
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<p>1 documents provided to you by counsel for 2 plaintiffs? 3 A. Produced documents were 4 supplied to me in the folder that is 5 listed, production documents. 6 Q. Did you ask for those 7 specific documents? 8 A. I did not. 9 Q. Do you know what the 10 methodology was for selecting those 11 specific documents to send to you? 12 A. I do not. 13 MS. O'DELL: Object to the 14 form. 15 THE WITNESS: Sorry. 16 BY MR. HEGARTY: 17 Q. Did you ask for any 18 additional documents that would fall 19 under the definition of produced 20 documents besides those plaintiffs' 21 counsel provided to you? 22 A. Not to my knowledge. 23 Q. Did you review all the 24 documents that are listed under the</p>	<p>1 plausibility? 2 MS. O'DELL: Object to the 3 form. 4 THE WITNESS: Did not ask it 5 in that manner. 6 I did ask for in vitro 7 studies that they could find, ex 8 vivo studies, and I also did my 9 own literature search. Yes. 10 BY MR. HEGARTY: 11 Q. Were you -- did you 12 understand that -- or do you understand 13 that you've been provided with all the 14 produced documents that concern biologic 15 plausibility? 16 MS. O'DELL: Object to form. 17 THE WITNESS: I have no 18 knowledge of whether I received 19 all documents. 20 BY MR. HEGARTY: 21 Q. With regard to the produced 22 documents, did you sign a protective 23 order before reviewing those documents? 24 A. Regarding these produced</p>

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<p style="text-align: right;">Page 146</p> <p>1 documents --</p> <p>2 Q. Yes.</p> <p>3 A. -- did I sign a protective</p> <p>4 order?</p> <p>5 Q. Yes.</p> <p>6 MS. O'DELL: Object to the</p> <p>7 form. It's a confidentiality</p> <p>8 order in this litigation. You may</p> <p>9 not be aware of it.</p> <p>10 MR. HEGARTY: Okay, well,</p> <p>11 confidentiality order.</p> <p>12 MS. O'DELL: Just so it's</p> <p>13 not unclear to the witness.</p> <p>14 BY MR. HEGARTY:</p> <p>15 Q. Did you sign a</p> <p>16 confidentiality order before reviewing</p> <p>17 the Bates-stamped documents?</p> <p>18 A. I signed a confidentiality</p> <p>19 agreement early on.</p> <p>20 Q. Do you rely on any tests for</p> <p>21 purposes of your opinions that are not</p> <p>22 reported in the medical literature?</p> <p>23 A. Again --</p> <p>24 MS. O'DELL: Object to the</p>	<p style="text-align: right;">Page 148</p> <p>1 experiments that I'm aware of that</p> <p>2 were done that I have knowledge</p> <p>3 of? No I have no knowledge of any</p> <p>4 laboratory testing or experimental</p> <p>5 testing in this field.</p> <p>6 BY MR. HEGARTY:</p> <p>7 Q. You did not do any testing</p> <p>8 yourself for purposes of developing your</p> <p>9 opinions in this case, correct?</p> <p>10 A. I did not do any laboratory</p> <p>11 tests.</p> <p>12 Q. All the opinions that are</p> <p>13 set out in your report about biologic</p> <p>14 plausibility between talc and ovarian</p> <p>15 cancer were formed after being contacted</p> <p>16 by counsel for plaintiffs about</p> <p>17 testifying as an expert in this case,</p> <p>18 correct?</p> <p>19 MS. O'DELL: Objection to</p> <p>20 form.</p> <p>21 THE WITNESS: After being</p> <p>22 contacted by the plaintiffs I did</p> <p>23 a literature search and followed</p> <p>24 the science.</p>
<p style="text-align: right;">Page 147</p> <p>1 form.</p> <p>2 THE WITNESS: Please</p> <p>3 describe "tests."</p> <p>4 BY MR. HEGARTY:</p> <p>5 Q. Well, did you rely on any</p> <p>6 testing or tests for purposes of your</p> <p>7 opinions that are not contained in the</p> <p>8 medical literature --</p> <p>9 MS. O'DELL: Objection to</p> <p>10 form.</p> <p>11 BY MR. HEGARTY:</p> <p>12 Q. -- that we wouldn't have</p> <p>13 access to but that you did?</p> <p>14 MS. O'DELL: Object to the</p> <p>15 form. Besides those produced in</p> <p>16 the litigation?</p> <p>17 MR. HEGARTY: Yeah, that</p> <p>18 goes without saying.</p> <p>19 MS. O'DELL: It doesn't go</p> <p>20 without saying. It's an unfair</p> <p>21 question.</p> <p>22 THE WITNESS: So if I</p> <p>23 understand your question to mean</p> <p>24 are there any laboratory</p>	<p style="text-align: right;">Page 149</p> <p>1 BY MR. HEGARTY:</p> <p>2 Q. That's not my question,</p> <p>3 Doctor.</p> <p>4 My question is, all the</p> <p>5 opinions set out in your report about</p> <p>6 biologic plausibility as they relate to</p> <p>7 talc and ovarian cancer were formed after</p> <p>8 being contacted by counsel for</p> <p>9 plaintiffs, correct?</p> <p>10 A. That is correct.</p> <p>11 Q. Can you cite for us any</p> <p>12 occasion where you've done the exact same</p> <p>13 thing that you have done here to prepare</p> <p>14 your report; that is, do an analysis of</p> <p>15 the literature on the biologic</p> <p>16 plausibility between the exposure to a</p> <p>17 substance and a disease?</p> <p>18 A. Nothing has been done</p> <p>19 exactly like it's been here, but for</p> <p>20 advisory boards that I've been on,</p> <p>21 including the National Toxicology Board,</p> <p>22 the Institute of Medicine, the Institute</p> <p>23 of Engineering for the National Academies</p> <p>24 of Science, we have -- we were requested</p>

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<p>1 to do literature reviews on the question</p> <p>2 that's in front of them and come up with</p> <p>3 an opinion based upon our literature</p> <p>4 reviews.</p> <p>5 Q. Have you ever published an</p> <p>6 article in the medical literature where</p> <p>7 you've done the same thing that you've</p> <p>8 done here, which is to review all the</p> <p>9 literature on a substance and a disease</p> <p>10 and offer opinions as to whether there's</p> <p>11 biologic plausibility between that</p> <p>12 substance and a disease?</p> <p>13 A. I have written reviews that</p> <p>14 are a culmination of all of the</p> <p>15 literature that I reviewed on topics.</p> <p>16 Never one on ovarian cancer and talc.</p> <p>17 And to my knowledge, I have</p> <p>18 not offered an opinion, but followed a</p> <p>19 conclusion from the science.</p> <p>20 Q. I think my question is a</p> <p>21 little bit different. My question is,</p> <p>22 have you published any article in the</p> <p>23 literature where you have done</p> <p>24 essentially the same thing that you have</p>	<p>1 the words "biological feasibility" or</p> <p>2 "potential mechanisms" or "plausible" --</p> <p>3 I may have used the word "plausibility,"</p> <p>4 but I have used words that are similar to</p> <p>5 those.</p> <p>6 Q. Doctor, when did you first</p> <p>7 become aware of an alleged link between</p> <p>8 ovarian cancer and talc use?</p> <p>9 MS. O'DELL: Object to the</p> <p>10 form.</p> <p>11 THE WITNESS: When did I</p> <p>12 first become aware of the alleged</p> <p>13 link between ovarian cancer and</p> <p>14 talc use? From -- from the media.</p> <p>15 I would say maybe a year prior to</p> <p>16 being contacted by Ms. Emmel.</p> <p>17 BY MR. HEGARTY:</p> <p>18 Q. Can you cite for me any</p> <p>19 scientific or medical group, entity or</p> <p>20 organization who has concluded that</p> <p>21 genital talc use causes ovarian cancer?</p> <p>22 A. I -- really, my opinion is</p> <p>23 based on biological plausibility.</p> <p>24 Q. I understand that. But my</p>
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<p>1 done here, which is review all the</p> <p>2 literature on an exposure and a disease</p> <p>3 and offer opinions as to whether there's</p> <p>4 biologic plausibility between the</p> <p>5 exposure and the disease?</p> <p>6 A. Most of the papers that I</p> <p>7 publish will offer a potential, whether a</p> <p>8 speculative potential or one that is</p> <p>9 defined within other published literature</p> <p>10 as a potential mechanism of action or as</p> <p>11 potential plausible outcome.</p> <p>12 So for any published paper</p> <p>13 from the research that I've done or that</p> <p>14 people do, we explain an observation that</p> <p>15 has been found in our laboratory from</p> <p>16 testing, as you call it. And we will</p> <p>17 explain the observation in terms of</p> <p>18 biological plausibility, if that's what</p> <p>19 you're referring to.</p> <p>20 Q. Well, have you ever used the</p> <p>21 phrase "biologic plausibility" in any</p> <p>22 published article?</p> <p>23 A. I cannot cite them for you,</p> <p>24 but I -- I am confident that I have used</p>	<p>1 question is simply from your knowledge,</p> <p>2 here today, can you cite for me any</p> <p>3 scientific or medical group, entity or</p> <p>4 organization who has concluded that</p> <p>5 genital talc use causes ovarian cancer?</p> <p>6 MS. O'DELL: Object to the</p> <p>7 form.</p> <p>8 THE WITNESS: Well,</p> <p>9 concluded is -- is a word for</p> <p>10 discussion.</p> <p>11 IARC in the 1993 report from</p> <p>12 inhalation toxicology and</p> <p>13 inhalation of talc did show that</p> <p>14 there was tumor induction in</p> <p>15 female rats in the lungs and that</p> <p>16 there was adrenal gland tumors</p> <p>17 that were formed.</p> <p>18 BY MR. HEGARTY:</p> <p>19 Q. Well, IARC has never</p> <p>20 concluded that the use of talc in the</p> <p>21 genital area causes ovarian cancer,</p> <p>22 correct?</p> <p>23 A. You asked me whether there</p> <p>24 was any body of literature or any</p>

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<p>1 advisory boards or any institution which 2 has concluded that there is a causal 3 relationship. And I've cited to you a 4 study -- 5 Q. That's not my question. My 6 question was can you cite for me any 7 scientific or medical group, entity or 8 organization who has concluded that 9 genital talc use causes ovarian cancer. 10 MS. O'DELL: Object to the 11 form. 12 THE WITNESS: I have -- I 13 have given you information on a 14 study done at the national 15 toxicology program. 16 BY MR. HEGARTY: 17 Q. Is that the extent of your 18 answer? 19 A. There are -- to my 20 knowledge, that's the best study that I 21 can cite to you. 22 Q. That's a study, correct? 23 A. That was a study, and they 24 are also a body that makes conclusions.</p>	<p>1 BY MR. HEGARTY: 2 Q. II-B is possibly 3 carcinogenic, correct? 4 A. To humans. 5 Q. I'm sorry? 6 A. To humans. Possibly 7 carcinogenic to humans. That doesn't 8 exclude the fact that there is animal 9 data supporting that conclusion. If 10 there were no animal data it -- it would 11 not even be considered a II-B. So 12 there -- there's evidence that the IARC 13 evaluated and came up with a II-B 14 classification. 15 Q. Is it your opinion that the 16 biologic plausibility of talc products 17 causing ovarian cancer has been generally 18 accepted in the medical community? 19 A. I think it depends on the 20 medical community. 21 Q. Well, aside from any medical 22 community that has accepted that there is 23 biologic plausibility between the use of 24 talc products in -- in ovarian cancer.</p>
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<p>1 Q. That study did not involve 2 any commentary on ovarian cancer, 3 correct? 4 A. The study did not involve 5 commentary on that. 6 Q. Can you name any regulatory 7 body who has stated that talc use is a 8 cause of ovarian cancer? 9 A. Not as I sit here right now. 10 But again, making conclusions on 11 causation was not my question, is not 12 my -- is not within my purview. 13 And there are different 14 levels of cancer conclusion. For 15 instance, IARC has several 16 classifications. And -- as you know, I, 17 II-A, II-B, et cetera. 18 Q. And what is IARC's 19 classification of talc use in the genital 20 area? 21 MS. O'DELL: Object to the 22 form. 23 THE WITNESS: To my 24 knowledge, I think it's a II-B.</p>	<p>1 Let me -- let me restate that. 2 Can you cite for me any 3 medical community that has accepted that 4 there is biologic plausibility of talc 5 products causing ovarian cancer? 6 A. I'm not knowledgeable at -- 7 about all the medical communities and 8 what disciplines they are in. 9 Q. Well, can you cite for me 10 any medical or scientific community that 11 has accepted that there is biologic 12 plausibility of talcum powder products 13 causing ovarian cancer? 14 A. I have no knowledge of that. 15 That doesn't mean it's not out there. It 16 means that I have no knowledge of that. 17 Q. You have no knowledge -- 18 you -- so you cannot testify that the 19 medical or scientific communities have 20 accepted that there is biologic 21 plausibility of talcum powder products 22 causing ovarian cancer? 23 MS. O'DELL: Object to the 24 form.</p>

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<p>1 THE WITNESS: What I'm 2 saying is I have no knowledge of 3 the documents they have put out 4 with a conclusion as a white paper 5 or any other published literature 6 that has made that conclusion. 7 BY MR. HEGARTY: 8 Q. What does -- sorry. 9 A. Or has not made that 10 conclusion. 11 Q. What does general acceptance 12 mean to you? 13 A. General acceptance -- for 14 example, benzene, it causes leukemia and 15 other blood cancers. That is a general 16 acceptance by the medical community which 17 we all adhere to, abide by, based upon 18 the excessive amount of literature that 19 is out there showing -- proving and 20 addressing Hill's criteria and coming up 21 with the fact that it is a -- it is a 22 carcinogen for blood cancers. 23 That is general knowledge. 24 General knowledge is something saying</p>	<p>1 Thank you. 2 BY MR. HEGARTY: 3 Q. You don't -- you don't know 4 what a cosmetic is? 5 A. I'm asking you what your 6 definition is. 7 Q. Well, I -- what is your 8 definition? 9 A. A definition of a cosmetic 10 is -- since I'm not in the cosmetic 11 field -- a cosmetic is something that is 12 used for hygiene or aesthetics and used 13 dermally. 14 Q. Have you ever written any 15 scientific article about a cosmetic under 16 your definition? 17 A. Not to my knowledge, but I 18 would have to look at all of my papers 19 again, if you'd like me to do that. 20 Q. Can you cite for me any 21 publication of yours where you comment on 22 asbestos? 23 A. I would have to look at my 24 references. I go back from 1982.</p>
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<p>1 that nickel can be a carcinogen, nickel 2 is a carcinogen and is classified by IARC 3 as a I. In that case, the general 4 population is aware of that. 5 Q. Before being hired by the 6 plaintiffs' lawyers in this case, you had 7 never written anything about talc, 8 correct? 9 A. That's correct. 10 Q. Or commented on talc in any 11 setting, correct? 12 A. Other than teaching? 13 Q. Other than the teaching 14 reference you cited earlier? 15 A. That's correct. 16 Q. Before being hired by 17 plaintiffs' counsel you had never written 18 anything about any cosmetic, correct? 19 MS. O'DELL: Object to the 20 form. 21 Could you please -- it's 22 vague in terms of cosmetic. Do 23 you have a definition in mind? 24 THE WITNESS: Exactly.</p>	<p>1 Q. Sitting here today, can you 2 cite for us, without looking at any 3 references, any article you've ever 4 written about asbestos? 5 MS. O'DELL: Doctor, if you 6 need to look at your CV, you're 7 welcome to do that. 8 BY MR. HEGARTY: 9 Q. Well, my question didn't ask 10 about the CV. I said just simply sitting 11 here today, just based on your memory -- 12 A. Okay. 13 Q. -- are you able to recall 14 any article you've ever written about 15 asbestos. 16 MS. O'DELL: If you would 17 like to look at your CV, it's in 18 front of you. You are welcome 19 to -- to do that. 20 MR. HEGARTY: I'll withdraw 21 the question. 22 BY MR. HEGARTY: 23 Q. Doctor, have you ever 24 written any article about a fragrance?</p>

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<p>1 A. I would also like to look at 2 my CV. 3 Q. Without looking at your CV, 4 you can't say one way or the other? 5 A. I can't say conclusively. 6 My CV and my publications go back to 7 1982. It was quite a while ago. 8 Q. And you can't say 9 conclusively whether you've written an 10 article about asbestos? 11 A. I would rather look at my -- 12 my publications. 13 Q. Okay. Have you ever 14 written -- 15 A. Would you like me to do 16 that, sir? 17 Q. No. I'm not asking you to 18 do that right now. 19 A. Thank you. 20 Q. Sitting here today without 21 looking at your CV, can you cite for me 22 any article you've ever written about 23 asbestos? 24 MS. O'DELL: Objection to</p>	<p>1 as scientists, involved as co-authors, 2 oftentimes. And I do not recall back to 3 1982. 4 Q. Well, for purposes of your 5 report, you do not cite to any of your 6 own work, correct? 7 A. That is correct. 8 Q. You've never written 9 anything about talc and ovarian cancer, 10 correct? 11 A. I think I asked and answered 12 that. I think I answered that. But I 13 can repeat it. 14 Q. No, you did not. I did not 15 ask you that question, ma'am. 16 A. So can -- 17 Q. I asked you had you ever 18 written anything about talc. My question 19 that I just asked you is have you ever 20 written anything about talc and ovarian 21 cancer? 22 A. To my knowledge, as I sit 23 here now without looking at my 24 publications, no.</p>
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<p>1 form. 2 THE WITNESS: To my 3 knowledge at this particular 4 moment, I cannot cite for you an 5 article that I specifically wrote 6 on asbestos. Whether or not I was 7 a co-author on one, I cannot 8 recall. 9 BY MR. HEGARTY: 10 Q. Would that be the same 11 answer as to a fragrance? 12 A. I -- I would really rather 13 look at my CV and my publications and 14 book chapters. 15 Q. Before being contacted by 16 counsel for plaintiffs in this case, you 17 had never developed or offered any 18 opinions about talc, correct? 19 A. That is correct. 20 Q. You've never written 21 anything about ovarian cancer, correct? 22 A. Again, just to put on the 23 record, I would really like to look at my 24 CV and look at my publications. We are,</p>	<p>1 Q. Prior to being contacted by 2 plaintiff's counsel have you ever 3 reviewed the body of literature on the 4 etiologies or biology related to ovarian 5 cancer? 6 A. Not prior to being 7 contacted, no. 8 Q. You've never published any 9 opinions about the causes of ovarian 10 cancer, correct? 11 A. To my knowledge, sitting 12 here, no. 13 Q. You never published any 14 opinions about the risk factors for 15 ovarian cancer, correct? 16 A. I really -- I'm not sure. I 17 know that I have given that information, 18 not an opinion, but have given that 19 information in teaching courses. 20 Q. Have you ever taught any 21 courses on asbestos? 22 A. Asbestos has been included. 23 I give lectures in my organ system 24 toxicology course as well as in my</p>

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<p style="text-align: right;">Page 166</p> <p>1 toxicology course for biology masters. I 2 give courses in air pollutants and 3 cancer-causing agents and the toxicology 4 of -- of airborne. 5 Q. Have you ever taught in your 6 courses any discussion about fragrances 7 and toxicity? 8 A. It may have come up as a 9 minor point. We talk about pesticides, 10 we talk about air pollutants. We talk 11 about metals. Fragrances, we talked 12 about limonene, eugenol, menthol and 13 other fragrances in that realm in the 14 discussion of electronic cigarettes and 15 the aerosols produced by them. 16 Q. And you provided to us all 17 the lectures or the content of lectures 18 that you've given where you mentioned 19 talc, correct? 20 A. I was not asked to -- 21 MS. O'DELL: Object to the 22 form. 23 THE WITNESS: I was not 24 asked to provide them. But please</p>	<p style="text-align: right;">Page 168</p> <p>1 reproductive docs who do focus on this, 2 yes. 3 Q. And that has not been an 4 area of your focus, correct? 5 A. Not -- not in past. Has not 6 been a primary focus. 7 Q. You have provided for us 8 your CV, correct? 9 A. That is correct. 10 Q. That's included as part of 11 Exhibit B to your expert report, correct? 12 MS. O'DELL: Objection to 13 form. 14 THE WITNESS: I think it's 15 stated here as Exhibit A. 16 BY MR. HEGARTY: 17 Q. It's Exhibit A to your 18 expert report. Is that a current CV of 19 yours? 20 A. It was updated in 21 August 2018. So it is not completely 22 updated as of January 2019. 23 Q. Did you bring an updated CV 24 to your deposition?</p>
<p style="text-align: right;">Page 167</p> <p>1 let me explain my teaching style. 2 My teaching style is such 3 that I use few PowerPoints as 4 queues. And much of my teaching 5 is done verbally, one-on-one. And 6 they're not recorded. 7 So there is really not that 8 much -- there is nothing to supply 9 to counsel. 10 BY MR. HEGARTY: 11 Q. Well, other than the 12 reference that you provided to us earlier 13 about talc and ovarian cancer, you have 14 not otherwise lectured regarding this 15 subject, correct? 16 A. That is correct. 17 Q. There are toxicologists who 18 focus on issues dealing with reproductive 19 medicine or reproductive sciences such as 20 ovarian cancer and uterine cancer, 21 correct? 22 A. There are scientists whose 23 major focus is on talc and ovarian cancer 24 and there are OB/GYNs as well as</p>	<p style="text-align: right;">Page 169</p> <p>1 A. I did not. 2 Q. As you stated -- 3 A. I'm sorry. I can provide 4 that. 5 Q. Does your CV anywhere list 6 any professional experience on ovarian 7 cancer? 8 A. Excuse me. Not to my 9 knowledge, in briefly reviewing my CV, 10 and not to my knowledge as I sit here. 11 Q. Does your CV list any 12 professional experience regarding 13 asbestos? 14 A. Specifically, asbestos as I 15 review, no. No, sir. 16 Q. Does your CV list any 17 professional experience regarding 18 fragrances? 19 A. Not to my knowledge, no, 20 sir. But you're asking me only what's in 21 my CV. 22 I have -- I have worked -- I 23 have looked at or heard about from other 24 advisory boards things to do with</p>

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<p>1 flavorants, as I said with electronic 2 cigarettes, hookah and smokeless tobacco. 3 So I am familiar with other -- which may 4 not be listed here in detail, which is 5 not listed here in detail, on flavorants 6 and some of those same flavors used in 7 electronic cigarettes are also, I found, 8 listed here. 9 Q. Has any entity or agency 10 consulted you with regard to diseases of 11 the female reproductive tract? 12 MS. O'DELL: Object to the 13 form. 14 THE WITNESS: Not to my 15 knowledge. 16 BY MR. HEGARTY: 17 Q. And no one has ever asked 18 you to look into any of the issues set 19 out in your report besides plaintiffs' 20 counsel, correct? 21 A. I'm sorry. Again? 22 Q. No one has asked you to look 23 at the issues set out in your expert 24 report in this case other than</p>	<p>1 or scientist who believes that there is 2 biologic plausibility between use of 3 talcum powder and ovarian cancer? 4 MS. O'DELL: Object to form. 5 THE WITNESS: I have not 6 spoken to any doctors in that 7 regard. 8 BY MR. HEGARTY: 9 Q. How about any scientists? 10 A. I have not spoke to any 11 scientists in that regard. 12 Q. Have you -- 13 A. My opinion was specifically 14 based upon the scientific literature that 15 I had access to. 16 Q. Have you ever had your 17 deposition taken before? 18 A. I have. Yes, sir. 19 Q. How many times? 20 A. One that I can recall. Two 21 that I'm now recalling. One that was 22 in -- for Dow Chemical on breast implants 23 and relationship with autoimmune disease 24 and one from a personal attorney who</p>
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<p>1 plaintiffs' counsel, correct? 2 A. This specific ovarian cancer 3 and asbestos, that is correct. 4 Q. You have not submitted your 5 expert report in this case for peer 6 review, correct? 7 A. The only ones who have seen 8 my report have been the plaintiff 9 attorneys, to my knowledge. 10 If that was given out to 11 others at that point, I do not -- I do 12 not have knowledge of that. 13 Q. You certainly have not 14 submitted your report for peer review, 15 correct? 16 A. I have not submitted my 17 report for peer review. 18 Q. Have you spoken to any 19 physicians who treat ovarian cancer 20 regarding talc and ovarian cancer? 21 A. I have not. 22 Q. Other than experts 23 identified by plaintiffs in this 24 litigation, can you identify any doctor</p>	<p>1 was -- who had a client who was exposed 2 to wood burning from a wood stove, an 3 outdoor wood stove. 4 Q. As to the latter case, do 5 you know where that case was pending or 6 was filed? 7 A. I was deposed in New York 8 City. 9 Q. Do you know the name of the 10 case? 11 A. I'm afraid not, sir. 12 Q. How long ago was it? 13 A. 15 years. 14 Q. You were testifying on 15 behalf of the plaintiff in that case? 16 MS. O'DELL: Object to form. 17 THE WITNESS: I was not 18 testifying. I was deposed for 19 the -- sorry, for the person who 20 was making the claim that they had 21 increased asthma as a result of 22 neighbors use of a wood boiler. 23 BY MR. HEGARTY: 24 Q. In the Dow Chemical breast</p>

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<p>1 implant case, were you testifying as an 2 expert witness? 3 A. I was. 4 Q. On behalf of the plaintiffs? 5 A. If you're talking about on 6 the part of Dow, yes. 7 Q. Well, on the part of Dow who 8 was the defendant or the plaintiffs? 9 A. Dow was the defendant. I'm 10 sorry. 11 Q. Were you testifying on 12 behalf of Dow? 13 A. I was. 14 Q. Any other cases you've been 15 deposed in? 16 A. Not that I can recall. 17 Q. Have you been identified in 18 any other cases as an expert witness 19 besides this one to your knowledge? 20 A. I have done literature 21 reviews for a number of attorneys but 22 have not been deposed. 23 Q. My question is specific to 24 whether you -- whether you are aware that</p>	<p>1 cases -- are there any articles on which 2 you rely for purposes of your opinions -- 3 strike that. Let me ask it a different 4 way. 5 How many articles have you 6 published since August of 2018? 7 A. I'm going to look at the 8 last publication. 9 I have one that was accepted 10 in press on the Garfield community and 11 looking at chromium exposure and doing 12 community engagement for the community 13 and looking at blood level of 14 measurements -- or toenail measurements, 15 excuse me, toenail measurement of 16 chromium, as they're impacting 17 communities environmentally. 18 Also two publications have 19 come out with the lead author, my being a 20 corresponding author with the lead author 21 being from the University of Rochester in 22 the area of inhaled particulate matter 23 and -- during pregnancy and effects on 24 the -- on the offspring and on the fetus.</p>
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<p>1 you've been designated, identified, in 2 the case as a testifying expert besides 3 this case. Are you aware of any such 4 cases? 5 A. Not to my knowledge. 6 Q. I know I referred earlier to 7 your CV. But I'm marking it as 8 Exhibit 22. You can look at that one or 9 Exhibit 22. 10 (Document marked for 11 identification as Exhibit 12 Zelikoff-22.) 13 BY MR. HEGARTY: 14 Q. Are there any publications 15 of yours that relate to any of the issues 16 in this case that are not included in 17 your CV? 18 MS. O'DELL: Object to form. 19 THE WITNESS: Let's talk 20 about the issues of the case. Can 21 you define them a little better? 22 BY MR. HEGARTY: 23 Q. Yeah, let me ask you a 24 different question. Are there any</p>	<p>1 Q. You are not a medical 2 doctor, correct? 3 A. I am not a medical doctor, 4 although I did go to medical school for 5 my Ph.D. training. 6 Q. You can't treat patients, 7 correct? 8 A. I do not treat patients. 9 Q. You are not an oncologist, 10 correct? 11 A. I am not an oncologist. 12 Q. You have no training in 13 oncology, correct? 14 A. I have no training in 15 oncology. I have training in pathology, 16 which is what I got my Ph.D. degree in at 17 a medical school. 18 Q. You have never diagnosed or 19 treated a disease in a patient, including 20 cancer, correct? 21 A. That is correct. 22 Q. You have no expertise in 23 treating patients with ovarian cancer, 24 correct?</p>

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<p>1 A. I have no expertise in that, 2 no. 3 Q. You have no expertise in 4 diagnosing ovarian cancer, correct? 5 A. I do not. 6 Q. You are not an expert on 7 asbestos, correct? 8 A. I have not been classified 9 as an expert in asbestos, although as I 10 said, I do work in air pollution and if 11 asbestos is in the confines -- taken in 12 the confines of air pollution, I could 13 speak to that. But I have not been 14 designated as an expert. 15 Q. What's the difference 16 between amphibole and serpentine forms of 17 asbestos? 18 MS. O'DELL: Object to form. 19 BY MR. HEGARTY: 20 Q. You can answer. 21 A. It depends on whether it's 22 asbestiform or non-asbestiform. 23 Q. Okay. Asbestiform. What's 24 the difference between amphibole and</p>	<p>1 those forms can exist both in 2 crystalline form or in a 3 non-asbestiform. 4 So they are both -- both 5 concluded to be asbestos. 6 BY MR. HEGARTY: 7 Q. Well, are there any 8 differences between -- 9 A. By the EPA. 10 Q. Are there any differences 11 between amphibole and serpentine forms of 12 asbestos? 13 MS. O'DELL: Object to form. 14 THE WITNESS: Well, they are 15 different -- they are different 16 minerals. But they are both 17 classified as asbestos. 18 BY MR. HEGARTY: 19 Q. Any other differences? 20 A. It -- both of which contain 21 carcinogenic -- classified I, as IARC. 22 Both have within them carcinogenic 23 asbestos. To my knowledge, that is -- 24 that is all I --</p>
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<p>1 serpentine forms? 2 A. Well -- 3 MS. O'DELL: Object to the 4 form. 5 THE WITNESS: Amphibole 6 lists serpentine which is 7 associated with chrysotile. They 8 all have an aspect ratio of, 9 depending on who you are looking 10 at, whether it's three to one or 11 five to one. Johnson & Johnson 12 includes it as five to one, which 13 is length-to-width ratio. They 14 both have the same length-to-width 15 ratio. 16 If they're asbestiform, then 17 they are fibers that are made up 18 of fibrils. They both have that. 19 And they go in a 20 longitudinal manner and they are 21 in one direction. 22 Amphibole includes within it 23 the crocidolite, and as well as 24 tremolite, amosite, and some of</p>	<p>1 Q. What was the most 2 commercially used asbestos? 3 A. Well, it -- it depends on 4 the time. But for commercial use, in 5 paints and housing and insulation, it was 6 either chrysotile was used commercially 7 and crocidolite was also used 8 commercially. 9 Q. Okay. How did the supposed 10 toxicities various -- vary across the 11 various forms of asbestos? 12 MS. O'DELL: Object to the 13 form. 14 THE WITNESS: When you say 15 toxicity what do you mean? 16 BY MR. HEGARTY: 17 Q. The -- the toxicities vary 18 across the various forms. 19 MS. O'DELL: Object to the 20 form. 21 THE WITNESS: Mm-hmm. It 22 depends on the chemical 23 composition. It depends on the 24 surface material. It depends on</p>

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<p style="text-align: right;">Page 182</p> <p>1 the amount of iron. It depends on 2 the size of the fiber or the 3 crystal. 4 And so depending upon those 5 factors you are going to have 6 differences in toxicity. 7 BY MR. HEGARTY: 8 Q. Well, how does -- does 9 tremolite asbestos compare to chrysotile 10 asbestos in terms of toxicity? 11 A. I don't really -- I don't 12 think I can answer that in terms of 13 ranking it. I can tell you that 14 chrysotile is a well-known carcinogen, 15 well-established carcinogen by the 16 agencies. That tremolite is an amphibole 17 and it can exist in both forms, either 18 asbestiform in the long longitudinal 19 fibriles, or it can exist as a mineral 20 that has dimensions in all different 21 directions. 22 So tremolite -- it's 23 difficult to rank, but chrysotile appears 24 to be -- when you say more toxic, you</p>	<p style="text-align: right;">Page 184</p> <p>1 Q. You are not an expert in 2 fragrances, correct? 3 MS. O'DELL: Object to form. 4 THE WITNESS: I have -- I 5 have not been listed as an expert 6 in fragrances. 7 BY MR. HEGARTY: 8 Q. Would you consider yourself 9 an expert in fragrances? 10 A. I am a toxicologist so I can 11 review chemicals and make a decision or 12 assess their toxicity based on outcomes. 13 Q. Before being contacted by 14 Ms. Emmel in this case, would you have 15 considered yourself an expert in 16 fragrances? 17 MS. O'DELL: Objection. 18 THE WITNESS: Expert in 19 fragrances. It is not something I 20 studied in my own laboratory. 21 However, a toxicologist 22 should be able to go into the 23 literature and have a greater 24 knowledge than most people in</p>
<p style="text-align: right;">Page 183</p> <p>1 have to understand what is the outcome 2 that you're looking at. They can both 3 cause toxicity. I don't know what you 4 exactly mean by more toxic. 5 Do you mean at a given 6 dose -- what -- what do you mean by -- 7 Q. I didn't -- I didn't use the 8 word "more toxic." I just -- I asked you 9 how does tremolite asbestos compare to 10 chrysotile asbestos in terms of toxicity. 11 A. I think I -- yeah, that's a 12 very difficult question to a 13 toxicologist. Because when you compare 14 toxicity across -- across lines, you have 15 to somehow rank them based on a 16 particular outcome. 17 So toxicity could be does it 18 produce more lactate dehydrogenase when 19 put in a macrophages culture of -- of 20 pulmonary cells, or does it produce more 21 apoptosis. You can't just say toxicity 22 in my opinion. You have to give me an 23 outcome. Does this produce more toxicity 24 in this area.</p>	<p style="text-align: right;">Page 185</p> <p>1 looking up different chemicals. 2 BY MR. HEGARTY: 3 Q. You are not an expert on 4 talc, correct? 5 MS. O'DELL: Object to the 6 form. 7 THE WITNESS: I have done 8 much work in dust, including the 9 World Trade Center dust. I've 10 done work on diesel exhaust and 11 other things that are powders. So 12 particularly talc, I don't think I 13 am classified as a talc expert. 14 But as I said I've done much 15 work in other dusts, other 16 aerosols, vapors, gases, 17 particles, and I am an expert in 18 particles. 19 BY MR. HEGARTY: 20 Q. You are not a geneticist, 21 correct? 22 A. I'm -- if a geneticist is 23 someone who has been trained specifically 24 in genetics, I have not been trained in</p>

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<p>1 genetics. I have had courses in 2 molecular toxicology and I do teach some 3 molecular toxicology. 4 Q. You are not a mineralogist, 5 correct? 6 A. I am not a mineralogist. 7 Q. You are not an expert on 8 testing for the presence of asbestos, 9 correct? 10 A. I am not a chemist. 11 Q. You are not an expert on 12 testing the air for asbestos, correct? 13 A. We collect -- I collect 14 particles in the air. I do air 15 measurements. That is the basis of my 16 research. 17 When it comes to asbestos, 18 we will send those -- those filters out 19 to be analyzed by an expert laboratory, 20 and then we will help interpret the data. 21 Q. You are not an industrial 22 hygienist, correct? 23 A. I work with industrial 24 hygienists, but I do not have a degree in</p>	<p>1 components by percentage of Johnson's 2 Baby Powder? 3 MS. O'DELL: Object to the 4 form. Vague. 5 THE WITNESS: I cannot -- 6 although I have looked at it, I 7 cannot tell you that off the top 8 of my head. I would have to 9 look -- refresh my memory by 10 looking at an exhibit or a 11 document. 12 BY MR. HEGARTY: 13 Q. What were the current 14 components of Johnson's Baby Powder by 15 percentage from the 19 -- 1900s through 16 the present? 17 A. I cannot -- 18 MS. O'DELL: Excuse me. 19 Excuse me. Object to the form. 20 Vague. 21 THE WITNESS: I cannot give 22 you percentages off the top of my 23 head. If you allow me to look at 24 a document I -- I could tell you.</p>
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<p>1 it. 2 Q. You are not an expert on 3 Johnson's Baby Powder, correct? 4 MS. O'DELL: Objection to 5 form. 6 THE WITNESS: I am not an 7 expert on -- I -- could you 8 rephrase that? 9 BY MR. HEGARTY: 10 Q. I don't think I can. 11 A. I don't know what you mean 12 by expert. I mean I need to have -- I 13 think I need to have some criteria that 14 would make me an expert. If you are 15 talking about the number of publications 16 I have or whether I've testified. 17 I -- the word "expert" 18 throws me off a bit. 19 Q. Well, where is the talc for 20 J&J's Baby Powder been mined over the 21 years? 22 A. In Vermont, in Italy, and 23 also in Korea. 24 Q. What are the current</p>	<p>1 BY MR. HEGARTY: 2 Q. Are the opinions in your 3 report specific to particular 4 formulations of talcum powder consumer 5 products? 6 MS. O'DELL: Object to the 7 form. 8 THE WITNESS: Are the 9 opinions in your report specific 10 to particular formulations. 11 My opinion is based on 12 biological plausibility based on 13 studies that have used talcum 14 powder or talc or fibrous talc or 15 nonfibrous talc. 16 BY MR. HEGARTY: 17 Q. Did you analyze specifically 18 the biologic plausibility of the 19 components of Johnson's Baby Powder for 20 purposes of your opinions? 21 MS. O'DELL: Object to the 22 form. 23 THE WITNESS: I looked at 24 the individual components that I</p>

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<p>1 was aware of. And looked at their</p> <p>2 ability to cause inflammation,</p> <p>3 let's say, or their carcinogenic</p> <p>4 potential.</p> <p>5 BY MR. HEGARTY:</p> <p>6 Q. But did you look</p> <p>7 specifically -- did you specifically</p> <p>8 analyze biologic plausibility specific to</p> <p>9 J&J's -- strike that.</p> <p>10 Did you analyze biological</p> <p>11 plausibility specific to Johnson's Baby</p> <p>12 Powder in your report?</p> <p>13 A. If the literature was there,</p> <p>14 there was some -- I'm sorry, I can't</p> <p>15 remember the author now. But there were</p> <p>16 authors and investigators that did use</p> <p>17 Johnson's Baby Powder in their studies,</p> <p>18 and if they used those studies, and I</p> <p>19 used that for -- to provide biological</p> <p>20 plausibility, then yes.</p> <p>21 Q. What studies were done</p> <p>22 specific to Johnson's Baby Powder?</p> <p>23 MS. O'DELL: Object to the</p> <p>24 form.</p>	<p>1 in the question that I was asked to</p> <p>2 comment on, but from cursory knowledge</p> <p>3 there are different cell types.</p> <p>4 Q. What's the difference</p> <p>5 between a low grade and high grade tumor?</p> <p>6 A. The induction of</p> <p>7 invasiveness and proliferation capacity.</p> <p>8 Q. What is thought to be the</p> <p>9 primary origin of high-grade serous</p> <p>10 ovarian cancer?</p> <p>11 MS. O'DELL: Object to the</p> <p>12 form.</p> <p>13 THE WITNESS: Primary</p> <p>14 origin. I'm not sure what that</p> <p>15 means.</p> <p>16 BY MR. HEGARTY:</p> <p>17 Q. Well, what is -- what is</p> <p>18 typically the primary location or origin</p> <p>19 of high-grade serous?</p> <p>20 A. Do you mean in the ovary?</p> <p>21 Q. I don't think I can ask it</p> <p>22 any different way.</p> <p>23 A. Well, I don't quite</p> <p>24 understand your question.</p>
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<p>1 THE WITNESS: Of course all</p> <p>2 of the product documents.</p> <p>3 Sorry, I'm having difficulty</p> <p>4 recalling that -- the particular</p> <p>5 name. It's not a memory test.</p> <p>6 I'm sorry.</p> <p>7 BY MR. HEGARTY:</p> <p>8 Q. With regard to ovarian</p> <p>9 cancer, what are the subtypes of the</p> <p>10 disease?</p> <p>11 A. Well, as -- as --</p> <p>12 MS. O'DELL: Object to the</p> <p>13 form.</p> <p>14 THE WITNESS: -- was pointed</p> <p>15 out, I'm not an OB/GYN. I can</p> <p>16 tell you just from cursory</p> <p>17 knowledge that there are serous,</p> <p>18 high grade, low grade serous,</p> <p>19 endometrioid, mucous cell,</p> <p>20 epithelioid.</p> <p>21 BY MR. HEGARTY:</p> <p>22 Q. What are the differences in</p> <p>23 subtypes?</p> <p>24 A. Again, this is not in my --</p>	<p>1 Q. What is the primary origin</p> <p>2 of clear cell carcinoma?</p> <p>3 MS. O'DELL: Object to the</p> <p>4 form.</p> <p>5 THE WITNESS: If you're</p> <p>6 asking me the types, I don't</p> <p>7 recall the type of cell for clear</p> <p>8 cell carcinoma. Again, I'm not an</p> <p>9 OB/GYN, and I'm not a histologist.</p> <p>10 BY MR. HEGARTY:</p> <p>11 Q. For purposes of your report,</p> <p>12 did you analyze biologic plausibility for</p> <p>13 each subtype of ovarian cancer?</p> <p>14 A. No, sir.</p> <p>15 Q. Is it your opinion that the</p> <p>16 etiology of each of the subtypes of</p> <p>17 ovarian cancer is the same?</p> <p>18 A. There are many</p> <p>19 commonalities.</p> <p>20 As I said, from my cursory</p> <p>21 knowledge and my background, early</p> <p>22 background in 1980, of being a --</p> <p>23 pathology when this was not even</p> <p>24 considered or thought about, there is</p>

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<p>1 etiologies -- I'm sorry, I had to refresh 2 my memory of your question. 3 There are different 4 etiologies. Many -- and many of the 5 same, and so I think that -- if I may 6 gather my thoughts and refresh your 7 question. 8 So as I said, in terms of my 9 opinion that the etiology in each of the 10 subtypes of ovarian cancer is the same, 11 there are many commonalities in -- 12 etiology being the underlying reason. 13 There are many commonalities for the same 14 cancers, including things like cancer 15 stem cells in ovarian cancer, which are 16 now being identified in the literature as 17 a possibility for recurrence of ovarian 18 cancer. 19 So, yes, there are definite 20 commonalities in terms of the induction 21 of ovarian types of cancer. 22 Q. Well, my question was, is it 23 your opinion that the etiologies of each 24 subtype are the same?</p>	<p>1 Remove your microphones. The time 2 is 12:22 p.m. Off the record. 3 (Lunch break.) 4 THE VIDEOGRAPHER: We are 5 back on the record. The time is 6 1:17 p.m. 7 BY MR. HEGARTY: 8 Q. Doctor, we're back on the 9 record. I want to go back to something 10 we talked about at the beginning, that 11 is, the initial call that you had from 12 Ms. Emmel. 13 You mentioned that you 14 reviewed materials between the time of 15 the call and the time that you agreed to 16 serve as an expert witness. Do you 17 recall saying that? 18 A. I do recall. 19 Q. What materials did you 20 review? 21 A. Just random, whatever I got 22 from the -- that came out using keywords 23 of talc, talcum powder, ovarian cancer. 24 Those were my initial keywords.</p>
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<p>1 MS. O'DELL: Objection to 2 form. 3 THE WITNESS: I have -- 4 MS. O'DELL: Asked and 5 answered. 6 THE WITNESS: I have no 7 opinion on that. 8 BY MR. HEGARTY: 9 Q. Is it your opinion -- 10 MS. O'DELL: Excuse me. 11 THE WITNESS: Other than 12 what I -- 13 MS. O'DELL: Sorry. 14 THE WITNESS: I'm sorry. 15 MS. O'DELL: You may finish. 16 I didn't mean to cut you off. 17 THE WITNESS: Other than 18 what I've just given. 19 MS. O'DELL: So, Mark, we've 20 been going about an hour and ten 21 minutes, I think. 22 MR. HEGARTY: Okay. Take a 23 break. 24 THE VIDEOGRAPHER: Stand by.</p>	<p>1 Q. Do you recall, sitting here 2 today, any particular articles, whether 3 by author name or by name of that initial 4 search that you did before agreeing to 5 serve as an expert? 6 A. I looked at Ghio, G-I -- 7 G-H-I-O. Did inhalation of talc and 8 airway cells in in vitro study. 9 I also looked at 10 Dr. De Boers and migration of carbon 11 black material. 12 I also looked at Dr. Venter 13 and Iturralde, who talked about 14 administered radiolabeled microspheres. 15 I read Dr. Weiner's -- 16 Weiner's -- Dr. Weiner's publication. I 17 read Dr. Epstein's letter. 18 Q. Is that something that you 19 found on your own? 20 A. Excuse me. It wasn't 21 Dr. Epstein's letter. I'm sorry. I 22 stand corrected. 23 I read the National 24 Toxicology Report, the NTP 1993.</p>

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<p>1 Q. Did you do a more expansive 2 literature search and literature review 3 after agreeing to serve as an expert 4 witness? 5 A. Of course. 6 Q. Did you form any opinions, 7 though, from that initial search that you 8 performed? 9 A. My opinion at that time was 10 that there was certainly -- I had a great 11 deal of interest in the topic, that there 12 was certainly enough information and 13 enough evidence to provide -- that was 14 provided by these publications that -- 15 certainly that particles of the size of 16 talc can be -- can be translocated, 17 migrated, and that -- at least from the 18 lung, and so that there was biological 19 plausibility for movement within the 20 body. 21 And I found it convincing 22 that I could -- that I could get involved 23 in this case and that I believe that 24 there was, at that point with only</p>	<p>1 known about the product is consistent 2 with a cause-and-effect relationship." 3 Do you see that where I'm 4 reading? 5 A. I see where you're reading. 6 Q. Where does that definition 7 of biological plausibility come from? 8 A. It is my professional 9 opinion. 10 Q. Is there still biological 11 plausibility if what is known about a 12 substance and a disease is consistent 13 with no cause-and-effect relationship? 14 MS. O'DELL: Object to the 15 form. 16 THE WITNESS: Biological 17 plausibility, to me, as stated 18 here -- and I will state it a 19 different way, is that there is 20 actually literature and 21 information, reliable, sound 22 science that could -- that 23 provides evidence that there is a 24 mechanism or mechanisms as well as</p>
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<p>1 superficial literature searching, that 2 there was indeed room for an opinion. 3 And that opinion being that there 4 certainly was information provided that 5 could lead me to provide biological 6 plausibility in that regard. Otherwise, 7 I would not have taken the case. 8 What I would like to say is 9 that I would have done the same thing if 10 you had called me, sir, to answer the 11 question of what my beliefs are and where 12 the science is. 13 Q. If you look at Page 2 again 14 of your expert report. 15 A. Yes, sir. 16 Q. That's Exhibit 2. Again, 17 under the section mandate -- 18 A. Yes. 19 Q. -- and methodology. 20 A. I see it. 21 Q. You say at the end of the 22 second paragraph that, "Biological 23 plausibility does not mean proof of 24 mechanism, but rather whether what is</p>	<p>1 underlying information that could 2 prove the -- although it's not 3 necessary in Hill's criteria, that 4 could be used to prove a causal 5 relationship. 6 And in this case, that 7 talcum powder, in particular 8 Johnson & Johnson talcum powder, 9 can lead to ovarian cancer. 10 BY MR. HEGARTY: 11 Q. Well, do you agree that the 12 finding of biologic plausibility by 13 itself does not mean causation? 14 A. Biological plausibility is 15 used to supplement or to add on. It is 16 actually one of Hill's criteria. One 17 that he listed in his 1962 paper that is 18 not absolutely necessary but does provide 19 compelling evidence. And I do believe 20 that biological plausibility is extremely 21 important, in my personal opinion, in 22 causal relationship. And Hill agrees to 23 that as well. 24 Q. You agree, though, that the</p>

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<p>1 other Hill factors should be applied to 2 determine causality, other than -- in 3 addition to biological plausibility? 4 A. Well, I really can't say. 5 Again, I know -- I know of Hill's work, 6 and I know of his groundbreaking 7 publication. But again, I'm here to talk 8 about plausibility, not causation. 9 Q. At the bottom of Page 2 you 10 say as part of your analysis you 11 reviewed, "Depositions and numerous 12 documents, internal memorandum and 13 published and unpublished studies and 14 testing results that I have found in my 15 own searches of documents, documents 16 provided by attorneys, and documents that 17 I requested." That's carrying over to 18 Page 3. 19 Do you see that? 20 A. Toxicological studies. Are 21 we talking about toxicological studies 22 including in vivo and in vitro? 23 Q. No. I'm looking at the very 24 last sentence of the paragraph at the</p>	<p>1 publication of yours, depositions or 2 expert reports in a litigation? 3 A. No. However, there are 4 papers and regulatory -- regulatory 5 documents that are not considered 6 published, published. If you mean 7 peer-reviewed literature, that's one way 8 of publishing. But another way of 9 publishing is also documents that are in 10 a report. 11 And I have used reports in 12 my own publications, if they -- if they 13 are accessible to me. 14 Q. Have you ever in a published 15 scientific article of yours cited to an 16 expert report from a doctor in a 17 litigation? 18 A. I'm sorry. I have to look 19 down at your question. 20 Not that I recall. But 21 that's not to say that I would not. 22 If it was appropriate for 23 the paper that I was writing, I would 24 certainly use it.</p>
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<p>1 bottom of Page 2, carrying over to the 2 top of Page 3? 3 A. In addition, I've reviewed 4 depositions and numerous documents 5 internal memorandum and published and 6 unpublished studies and testing results 7 that I have found in my own searches. 8 Q. Correct. In any scientific 9 analysis that you have done, have you 10 ever included as part of that analysis 11 documents provided by attorneys? 12 A. In my -- when I publish, I 13 look at all relevant information that I 14 have access to. It's about the science. 15 Q. Not my question. My 16 question is in any prior work that you 17 have done where you have published an 18 article, have you included in the review 19 for purposes of publishing that article, 20 documents provided by lawyers? 21 A. No, sir, not to my 22 knowledge. 23 Q. Have you ever included as 24 materials that you have reviewed for any</p>	<p>1 Q. Can you identify any 2 scientific group -- strike that. 3 Before I ask you about 4 causation, now I want to ask you about 5 biological plausibility. Can you cite 6 for me any scientific group, body, or 7 even paper that has concluded that there 8 is biological plausibility between 9 perineal talc use and ovarian cancer? 10 A. Mm-hmm-hmm. If you look at 11 -- I don't know what exhibit it is. But 12 it is the Health Canada report. And -- 13 Canadian U.S. EPA. And if you look at 14 Taher's paper, systemic review and 15 meta-analysis, in both of those -- okay. 16 So the environmental -- Health Canada and 17 Canadian EPA, they put out this -- this 18 document, which is an assessment, a 19 screening assessment document, to look at 20 biological plausibility as well as the 21 other epidemiological literature. 22 And they do speak to the 23 causation and they do speak to biological 24 plausibility of talc and its association</p>

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<p style="text-align: right;">Page 206</p> <p>1 or talc and it's causation for ovarian 2 cancer. So they do in that document. 3 The systematic review and 4 meta-analysis 2018 of Taher also speaks 5 of it and reviews the 30 -- I think it's 6 30 -- 30 studies, of which there are 26 7 case-controls and -- studies, and I think 8 four cohort studies. And they do also 9 conclude that, by looking at the 10 meta-analysis, that there are -- that 11 there is causation associated -- that 12 there is causation for talcum powder and 13 ovarian cancer. 14 Q. Actually, Doctor, both 15 documents to which you reference conclude 16 only that perineal use of talcum powder 17 is a possible cause of ovarian cancer, 18 correct? 19 MS. O'DELL: Object to the 20 form. 21 THE WITNESS: They state 22 cause. And if you give me a 23 moment, I can look for it, within 24 the document. So I'm looking at</p>	<p style="text-align: right;">Page 208</p> <p>1 MS. O'DELL: It's Exhibit 9. 2 BY MR. HEGARTY: 3 Q. If you would look -- do you 4 have the Taher review? 5 A. I do. 6 Q. What's that marked as? 7 A. That is Exhibit 10. 8 Q. Exhibit 10? 9 A. Based on your yellow mark, 10 yes. 11 Q. If you look at the abstract 12 under the conclusion section, it 13 concludes that perineal use of talcum 14 powder is a possible cause of human 15 ovarian cancer. 16 Do you see that? 17 A. Excuse me. I dropped my 18 microphone. 19 Okay. Please repeat your 20 question. Your comment. 21 Q. Second page under the 22 conclusion section. The conclusion of 23 the Taher article is, "The perineal use 24 of talc powder is a possible cause of</p>
<p style="text-align: right;">Page 207</p> <p>1 the Health Canada document. 2 Meta -- page -- I'm sorry. 3 Roman Numeral III, "Meta-analysis 4 of the available human studies in 5 the peer-reviewed literature 6 indicate a consistent and 7 statistically significant positive 8 association between perineal 9 exposure to talc and ovarian 10 cancer. Further available data 11 are indicative of causal effect." 12 BY MR. HEGARTY: 13 Q. Okay. What is their 14 ultimate conclusion? 15 A. This is part of their 16 conclusion. 17 Q. Can I look at that document? 18 A. Absolutely. 19 MR. TISI: Is this marked as 20 an exhibit, Mark? 21 MR. HEGARTY: Yes. 22 MR. FINDEIS: Sorry, which 23 number is it marked? So the 24 record is clear.</p>	<p style="text-align: right;">Page 209</p> <p>1 human ovarian cancer," correct? 2 MS. O'DELL: Objection to 3 form. 4 THE WITNESS: I see that 5 conclusion sentence. 6 BY MR. HEGARTY: 7 Q. Nowhere in here do they say 8 that talcum powder causes ovarian cancer, 9 correct? 10 MS. O'DELL: Objection to 11 form. 12 THE WITNESS: If you're 13 looking for a specific sentence, 14 allow me to review. 15 BY MR. HEGARTY: 16 Q. Well, are you going to need 17 to review the entirety of the paper? 18 A. I may. 19 Q. Okay. Well, I can't -- we 20 don't have time for you to review the 21 entirety of the paper so I'll withdraw 22 the question. If you need to review the 23 entirety of the paper. 24 Can you cite here without</p>

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<p style="text-align: right;">Page 210</p> <p>1 reviewing it anywhere where they say 2 talcum powder causes ovarian cancer? 3 A. I cannot -- 4 MS. O'DELL: Excuse me. And 5 you're referring specifically to 6 Exhibit 10? 7 MR. HEGARTY: Correct. 8 MS. O'DELL: The Taher 9 paper? 10 THE WITNESS: I can't say it 11 without looking at the paper. 12 BY MR. HEGARTY: 13 Q. Has the Taher paper been 14 peer reviewed? 15 A. The Taher paper has -- is a 16 document that, yes, has been peer 17 reviewed. To my knowledge. 18 Q. Okay. What publication peer 19 reviewed that document? 20 A. Excuse me? 21 Q. Who peer reviewed that 22 document? 23 A. I have -- I have no 24 knowledge of that.</p>	<p style="text-align: right;">Page 212</p> <p>1 letter, information. And I specifically 2 asked that same question. 3 Q. Now, are you relying on the 4 fact it's been peer reviewed for your 5 opinions in this case? 6 A. I'm relying on the science. 7 Q. Well, are you relying on 8 whether -- on what plaintiffs' counsel 9 told you as far as whether it's been peer 10 reviewed? 11 MS. O'DELL: Object to the 12 form. 13 THE WITNESS: That is what 14 I'm trying to look, whether there 15 is an acknowledgment and whether 16 there is a statement within it 17 which says it's peer reviewed. 18 It -- it's stated that in 19 order for this -- in order for a 20 document such as this, and again 21 it depends on what you mean by 22 peer review, whether it's a 23 community or whether it's the 24 government. The government has</p>
<p style="text-align: right;">Page 211</p> <p>1 Q. How do you know it's been 2 peer reviewed? 3 A. The -- the plaintiff lawyers 4 have shown me a document, a cover letter, 5 information, I specifically asked that 6 question of them. 7 Q. And are you relying on what 8 they provided to you for purposes of 9 saying it's peer reviewed? 10 A. Please allow me to -- I'm 11 going to take a look into the document 12 again. There may be evidence that's in 13 the document which says it's peer 14 reviewed. 15 Q. Doctor, what are you looking 16 at for purposes of peer review? I asked 17 you -- 18 A. I'm looking to see -- sorry, 19 please finish your question. 20 Q. I asked you how do you know 21 it's been peer reviewed. 22 A. And I stated that the 23 plaintiff lawyer -- the plaintiffs' 24 lawyers have shown me a document, a cover</p>	<p style="text-align: right;">Page 213</p> <p>1 looked at this, and they were 2 submitted by Health Canada, and as 3 of now it's been submitted for 4 peer review, but it was looked at 5 by the Health Canada and by EPA. 6 BY MR. HEGARTY: 7 Q. What document were you shown 8 that shows it's been peer reviewed? 9 A. On the first page, 10 Exhibit 10, materials submitted to Health 11 Canada, materials submitted to journal 12 for peer review. 13 Q. So it's not been peer 14 reviewed? 15 A. To my knowledge, it has been 16 peer reviewed. And again I'm relying on 17 plaintiffs' attorney with that 18 information. 19 Q. Have you ever cited in a 20 scientific article of yours a publication 21 that's not been peer reviewed? 22 A. All the time. 23 Q. So that's something that -- 24 that you have done as part of your</p>

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<p>1 methodology?</p> <p>2 MS. O'DELL: Object to the</p> <p>3 form.</p> <p>4 THE WITNESS: It's</p> <p>5 something -- if there is -- based</p> <p>6 on my opinion of the study design,</p> <p>7 the information, the science, if</p> <p>8 it -- if it needs to be stated, if</p> <p>9 the science needs to be out there,</p> <p>10 then I have cited numerous times</p> <p>11 unpublished information.</p> <p>12 BY MR. HEGARTY:</p> <p>13 Q. Do you understand that for</p> <p>14 purposes -- that the -- strike that.</p> <p>15 Do you understand that the</p> <p>16 Health Canada risk assessment is a --</p> <p>17 only a draft assessment at this point in</p> <p>18 time?</p> <p>19 A. It is going to be reviewed,</p> <p>20 yes. I understand that it -- it is a</p> <p>21 draft assessment. I also understand that</p> <p>22 it has gone through scrutiny by both</p> <p>23 Health Canada and Canadian EPA.</p> <p>24 Q. Do you understand that</p>	<p>1 or paper that has concluded that there is</p> <p>2 biologic plausibility between talcum</p> <p>3 powder use and ovarian cancer?</p> <p>4 A. Biological plausibility, in</p> <p>5 my case, and for my review and for my</p> <p>6 report, I'm looking at the inflammation</p> <p>7 as a biological plausibility.</p> <p>8 There is data going back and</p> <p>9 scientific reviews and publications going</p> <p>10 back to the '60s which implicate</p> <p>11 inflammation as a biological mediator for</p> <p>12 cancer.</p> <p>13 Q. Doctor, listen to my</p> <p>14 question. My question is very specific</p> <p>15 to talc and the biologic plausibility</p> <p>16 between talc and ovarian cancer.</p> <p>17 Can you cite for me, besides</p> <p>18 the Canadian documents you cited, any</p> <p>19 scientific group, body or organization</p> <p>20 that has concluded that there is biologic</p> <p>21 plausibility between talcum powder use</p> <p>22 and ovarian cancer?</p> <p>23 A. There is biological</p> <p>24 plausibility and there is evidence that</p>
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<p>1 there's a comment period that's going on</p> <p>2 right now?</p> <p>3 A. I understand that, yes.</p> <p>4 Q. And that this is not a final</p> <p>5 statement?</p> <p>6 A. Final statement. In any</p> <p>7 document, any regulatory document that --</p> <p>8 those that are put out by the National</p> <p>9 Academy of Science, whatever document</p> <p>10 you're using, there's always a peer</p> <p>11 review or comment period.</p> <p>12 In my opinion, in my</p> <p>13 professional career, documents do not</p> <p>14 change that drastically based upon the</p> <p>15 comments that come in. Based upon</p> <p>16 National Academy of Science, and the</p> <p>17 National Toxicology Program. There are</p> <p>18 usually not -- there are no -- by the</p> <p>19 time it reaches this point, there are no</p> <p>20 substantive comments that allow for</p> <p>21 extensive changes.</p> <p>22 Q. Other than the Canadian</p> <p>23 documents you just cited, can you cite</p> <p>24 for me any other scientific group, body</p>	<p>1 in Step 1, that talc causes inflammation.</p> <p>2 In Step 2, that inflammation is a</p> <p>3 well-known and well-established factor</p> <p>4 in -- in cancer.</p> <p>5 Q. Doctor, you are not</p> <p>6 answering my question. Do you want to</p> <p>7 read my question? My question is very</p> <p>8 specific.</p> <p>9 Can you cite for me any</p> <p>10 scientific body or group or organization,</p> <p>11 other than what you say the Canadian</p> <p>12 group or groups did, that has concluded</p> <p>13 that there is biologic plausibility</p> <p>14 between talcum powder use and ovarian</p> <p>15 cancer?</p> <p>16 MS. O'DELL: Objection.</p> <p>17 Objection to the question. Asked</p> <p>18 and answered.</p> <p>19 THE WITNESS: I stand by my</p> <p>20 answer. That, again, talc can</p> <p>21 cause inflammation. It's well</p> <p>22 known. And inflammation is an</p> <p>23 underpinning for cancer.</p> <p>24 BY MR. HEGARTY:</p>

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<p>1 Q. Okay. Cite for me any 2 scientific group, body or organization 3 who has said that. 4 A. That is throughout 5 literature. If you go back to 1960 and 6 talk about the Vertel and the role of 7 inflammation in cancer, and numerous 8 other publications since that, if you 9 look at -- talc is used to induce 10 pleurodesis because of its inflammatory 11 responsiveness. 12 Q. Doctor, you still are not 13 answering my question. My question is 14 name a scientific body, organization or 15 group who has concluded, as you have 16 done, or you say you do in your paper, 17 that there is biologic plausibility 18 between talc and ovarian cancer. 19 MS. O'DELL: Objection to 20 the form. 21 THE WITNESS: I gave you -- 22 BY MR. HEGARTY: 23 Q. Cite for me the groups. 24 MS. O'DELL: Excuse me. Let</p>	<p>1 biological mechanism that everyone 2 including the National Toxicology, the 3 IARC, the National Academy of Science, 4 EPA, all recognize. 5 Q. Cite for me any group. 6 Again, you are not answering my question. 7 My answer -- 8 A. Okay. 9 Q. -- my question is other than 10 the Canadian groups you've cited, cite 11 for me any group by name who has reached 12 the same opinion as you about biologic 13 plausibility. 14 MS. O'DELL: Objection to 15 form. Other than those she just 16 listed in her last answer? 17 MR. HEGARTY: Well, she 18 didn't list any. I think the 19 record shows that. 20 MS. O'DELL: Yes, she did. 21 MR. HEGARTY: Which ones did 22 she list? 23 MS. O'DELL: NTP. IARC. 24 MR. HEGARTY: Okay. Are you</p>
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<p>1 me -- objection to form. Asked 2 and answered. The doctor has 3 answered your question. You may 4 not like the answer, but she's 5 answered it. 6 BY MR. HEGARTY: 7 Q. Cite for me the groups by 8 name. 9 MS. O'DELL: Objection to 10 form. 11 THE WITNESS: Ask the 12 question again? 13 BY MR. HEGARTY: 14 Q. Cite for me any name of any 15 group that has reached the same opinion 16 as you? 17 A. Besides the Health Canada? 18 Q. Correct. 19 A. There are -- I -- you're 20 asking for something that is not -- I'm 21 answering the question by telling you 22 that you have talc which is an 23 inflamagogue, and you have talc and its 24 relationship with cancer. And that is a</p>	<p>1 going on the record to say NTP has 2 concluded that talcum powder use 3 is a biologic 4 plausibility/plausible cause of 5 ovarian cancer? 6 THE WITNESS: We're not -- 7 MS. O'DELL: She was talking 8 about inflammation and cancer, as 9 you well know. 10 MR. HEGARTY: Right, which 11 is why she's not answering my 12 question. 13 MS. O'DELL: No, no. Your 14 question was not in relation to 15 specific talc and biologic 16 plausibility. 17 So the doctor has answered 18 your question. 19 MR. HEGARTY: I think the 20 record will reflect otherwise. 21 BY MR. HEGARTY: 22 Q. Doctor, listen to my 23 question -- 24 MS. O'DELL: No, it will</p>

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<p style="text-align: right;">Page 222</p> <p>1 not. 2 BY MR. HEGARTY: 3 Q. Listen to my question. 4 Can you cite for me any 5 group besides the Canadian group who has 6 concluded that there is biologic 7 plausibility, who has made a statement 8 that there is biologic plausibility 9 between talcum powder use and ovarian 10 cancer? 11 A. I'm telling -- as I said 12 before, you're leaving out the word 13 "inflammation." 14 Q. Doctor, you -- you need to 15 answer the question I ask. 16 A. I -- I -- 17 Q. Your counsel can come back 18 and ask you that question. I under -- I 19 want to know the name of any organization 20 by name who has concluded that there is 21 biologic plausibility between perineal 22 use of talc and ovarian cancer. 23 A. Anyone -- 24 MS. O'DELL: Other than the</p>	<p style="text-align: right;">Page 224</p> <p>1 I've shown, whether it's in air pollution 2 or whether it's in tobacco products or 3 nicotine products or World Trade Center 4 dust or metal inhalation or nanoparticle 5 inhalation. They all give biological 6 plausibility statements for the 7 observations that have been found in my 8 laboratory. 9 Q. Where have you ever 10 published step-by-step methodology for 11 how you go about determining whether 12 there is biological plausibility between 13 a substance and a disease? 14 A. I use my professional 15 judgment. 16 Q. Have you ever published that 17 professional judgment? 18 MS. O'DELL: Objection to 19 form. 20 THE WITNESS: I don't think 21 that would be publishable 22 material. 23 BY MR. HEGARTY: 24 Q. In the end, Doctor, your</p>
<p style="text-align: right;">Page 223</p> <p>1 ones she -- she's listed. 2 THE WITNESS: Anyone that 3 you say -- any -- I'll do it 4 again. National Toxicology 5 Program. IARC. Institute of 6 Medicine. 7 They may not say the 8 sentence you are -- you are 9 implying or you're stating. But 10 they all show that talc has -- 11 produces inflammation. 12 I don't think that the -- I 13 think that's a very common 14 knowledge that talc or talcum 15 powder products does produce 16 inflammation. 17 BY MR. HEGARTY: 18 Q. Doctor, where have you ever 19 published a methodology for determining 20 whether there is biologic plausibility 21 between an exposure and a disease? 22 A. Almost every paper that I 23 have in my CV talks about the biological 24 plausibility for the observations that</p>	<p style="text-align: right;">Page 225</p> <p>1 report is your subjective take on the 2 studies, correct? 3 MS. O'DELL: Objection to 4 form. 5 BY MR. HEGARTY: 6 Q. I mean, you don't speak for 7 any scientific group, do you? 8 A. I'm an expert toxicologist, 9 recognized clearly by the Society of 10 Toxicology as an expert in my field. 11 And -- I'm sorry. I -- 12 Q. Well, is your report 13 speaking for the society -- 14 MS. O'DELL: Excuse me. 15 BY MR. HEGARTY: 16 Q. Is your report speaking for 17 the Society of Toxicology? 18 MS. O'DELL: She wasn't 19 finished. 20 THE WITNESS: I wasn't. I 21 was -- 22 MS. O'DELL: She wasn't 23 finished. Please let the witness 24 finish.</p>

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<p>1 MR. HEGARTY: I'll withdraw 2 the question. 3 BY MR. HEGARTY: 4 Q. Doctor, do you speak for the 5 Society of Toxicology for purposes of 6 your opinions in your report? 7 A. No. 8 Q. Do you speak for any 9 society, any toxicology society -- 10 society for purposes of your opinions? 11 A. You didn't let me finish my 12 answer. 13 I do not speak for the 14 society of toxicology. But I am a 15 recognized toxicology expert, recognized 16 by the Society of Toxicology as an 17 expert. And I have written this report 18 based upon literature, scientific 19 evidence, and my professional judgment. 20 Q. What society has recognized 21 you as an expert in talc and ovarian 22 cancer? 23 A. I'm recognized as expert in 24 toxicology.</p>	<p>1 form. 2 You can answer. 3 THE WITNESS: This is my 4 opinion based upon my systematic 5 review of all the scientific 6 literature. And they -- by the 7 nature of hiring me, they have 8 approved of my -- my opinions. 9 Maybe not specifically in this 10 case, but they would not have 11 hired me or kept me for 35 years 12 if they did not agree that I was a 13 well-known established 14 toxicologist whose opinions are 15 based in my professional judgment. 16 BY MR. HEGARTY: 17 Q. Did you tell the university, 18 New York University, of your opinions in 19 this case? 20 A. I did not. 21 Q. Have you told them that 22 you're an expert witness for plaintiffs 23 in this litigation? 24 A. I have, yes.</p>
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<p>1 Q. What society has -- 2 A. Society of Toxicology. 3 Q. Has the Society of 4 Toxicology recognized you as an expert in 5 talc and ovarian cancer? 6 MS. O'DELL: Objection to 7 form. 8 THE WITNESS: I was 9 recognized as an expert in tox and 10 ovarian cancer and talc by the 11 very basis that I'm sitting here. 12 BY MR. HEGARTY: 13 Q. You don't speak for your 14 university, do you? 15 A. No one -- no one speaks 16 directly for the university. But what we 17 say, we understand our paychecks come 18 from the university, and we follow within 19 the university and the medical school 20 guidelines. 21 Q. Are your opinions in this 22 case the opinions of New York University? 23 A. This is my -- 24 MS. O'DELL: Objection to</p>	<p>1 Q. Have you reported, in your 2 financial disclosure, the money that 3 you've made in this litigation? 4 A. Up until -- we are asked 5 that question -- we have to fill out 6 reports on transparency and conflicts of 7 interest. And I think the last time I 8 did it was in November of 2018. And I 9 reported up to that time, yes. We are 10 required to do that and, yes, I am 11 completely transparent. 12 So any money that I've made 13 since November, or since the filing of 14 the confidentiality agreement has not 15 been reported but will be coming in March 16 or April. 17 Q. You don't speak for any 18 journal for the purpose of your report, 19 do you? 20 A. For purposes of this report 21 I do not speak for journals. But I do 22 speak for journals because I'm an editor, 23 I'm an associate editor and on the 24 editorial boards for numerous</p>

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<p>1 environmental health and toxicology 2 journals. 3 Q. At the top of Page 3 of your 4 report, you say in the first full 5 paragraph that you considered the studies 6 that did not find an increased risk of 7 ovarian cancer with talc use. 8 Do you see that? 9 MS. O'DELL: What page are 10 you on? I'm sorry. 11 BY MR. HEGARTY: 12 Q. Page 3. 13 A. I'm sorry. I know we're on 14 Page 3. 15 Q. The first full paragraph. 16 A. My opinions below? 17 Q. The first full paragraph. 18 A. My opinions below. "My 19 opinions below" -- 20 Q. At the very -- at the very 21 end, you say you considered those studies 22 that did not find an increased risk. 23 Do you see that? 24 A. I'm reading it.</p>	<p>1 several, there are case-control 2 studies as well as cohort studies 3 which showed negative 4 associations. 5 BY MR. HEGARTY: 6 Q. You did not cite any of 7 those in your report, though, did you? 8 A. No. What I said -- I'm 9 sorry. Let me try and make it clear. 10 Yes, those meta-analyses 11 were included in the report or -- I need 12 to find the names. Systematic review 13 that I cited was 14 P-E-N-N-I-N-K-I-L-A-M-P-I 2018. And that 15 was a meta-analysis which reviewed the 16 epidemiological case-control and cohort 17 studies which showed that there were 18 studies that had negative associations. 19 Q. Is that the only reference 20 that you included in your report, to 21 studies that did not find an increased 22 risk of ovarian cancer with talc use? 23 MS. O'DELL: Object to the 24 form.</p>
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<p>1 Yes, okay. You were reading 2 in the middle of the sentence. "To my 3 knowledge, I considered and evaluated the 4 majority of all available relevant 5 studies in the process of evaluating the 6 literature, including those that reported 7 an elevated risk of ovarian cancer with 8 exposure to talc and those where other 9 chemicals were reported within talc-based 10 body powders, including those that did 11 not find an increased risk." Yes. 12 Q. You did not cite a single 13 paper in your report that did not find an 14 increased risk of ovarian cancer with 15 talc use, did you? 16 MS. O'DELL: Objection to 17 form. 18 THE WITNESS: There were -- 19 in reading over the meta-analysis 20 of -- I'm sorry, I'm probably 21 going to get his name wrong -- 22 Penninkilampi. 23 In reading over the 24 meta-analysis of several -- from</p>	<p>1 THE WITNESS: No. No. 2 MS. O'DELL: Excuse me. 3 Object to the form. 4 THE WITNESS: No. Under the 5 animal models on Page 13, there 6 were -- with rats that were 7 exposed by the peritoneum -- 8 perineum, sorry, to either talc or 9 no treatment. And while they did 10 find inflammatory response -- 11 again, going back to my biological 12 plausibility -- they did not find 13 neoplasms. 14 BY MR. HEGARTY: 15 Q. So that would be an example 16 of a study that did not show an increased 17 risk of ovarian cancer with talc use, 18 correct? 19 A. That is -- 20 MS. O'DELL: Object to the 21 form. 22 Go ahead. 23 BY MR. HEGARTY: 24 Q. Is that correct?</p>

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<p style="text-align: right;">Page 234</p> <p>1 A. Sorry. Repeat the question. 2 Repeat the question, please. 3 Q. Sure. So that is an example 4 of a study that, in your opinion, does 5 not show an increased risk of ovarian 6 cancer with talc use? 7 MS. O'DELL: Objection to 8 form. Go ahead. Sorry. 9 THE WITNESS: Sorry. 10 This is a study which shows 11 biological plausibility by showing 12 that there is a foreign body 13 reaction and inflammatory 14 response. However, it does not 15 show that there was any change in 16 neoplasm -- or any induction of 17 neoplasms or cancer. 18 BY MR. HEGARTY: 19 Q. Did you read any cell study 20 that showed that talc is not cytotoxic? 21 A. Can you please explain what 22 you mean by cytotoxic? I want to answer 23 the question as you understand it. 24 Q. What is your definition of</p>	<p style="text-align: right;">Page 236</p> <p>1 showing that talc was not toxic to cells? 2 A. I read comparison studies. 3 Let me please find that, the exact names. 4 Q. Let me withdraw the 5 question. Doctor, in your opinion is 6 talc mutagenic? 7 A. How do you define 8 "mutagenic"? 9 Q. Doctor, what's your -- 10 mutagenic is mutation to genes. Does 11 talc mutate genes? 12 A. Talc leads to changes in 13 gene expression which can be inferred as 14 a mutation. However, when you talk about 15 mutation, you have many different 16 mechanisms of mutation. Mutation can 17 occur as a result of a genotoxic or 18 direct impact on DNA, or it can occur as 19 a result of changes in the epigenome, 20 which leads to changes in expression of 21 the gene. 22 Q. Does talc directly mutate 23 genes? 24 A. Talc has been shown to</p>
<p style="text-align: right;">Page 235</p> <p>1 cytotoxicity? 2 A. I'd like to answer the 3 question that you're asking me. 4 Q. I'm asking you your 5 definition. The way a deposition works 6 is I ask you questions. You don't ask me 7 questions. 8 MS. O'DELL: Don't be -- be 9 courteous to the witness, please. 10 MR. HEGARTY: I am. 11 THE WITNESS: I appreciate 12 that. I just want to, as a 13 toxicologist, the word 14 "cytotoxicity" carries many 15 meanings. 16 BY MR. HEGARTY: 17 Q. What is your definition -- 18 basic definition of cytotoxicity? 19 A. There are many meanings. 20 Cytotoxicity taken literally meaning 21 toxicity to a cell. Cyto, cell; 22 toxicity, toxic. However, toxicity can 23 be measured by numerous endpoints. 24 Q. Did you read any studies</p>	<p style="text-align: right;">Page 237</p> <p>1 cause -- to cause changes in particular 2 enzymes in the gene expression. So a 3 mutation -- yes, it has been -- it has 4 been shown for mutation. But I just 5 need -- I need the attorneys to 6 understand that there are many ways to 7 mutate a cell, not only can you do it by 8 chemical agent, but you can also -- it 9 occurs with aging. 10 So you do not need -- I'm 11 sorry. You do not need genotoxicity to 12 produce mutagenesis. 13 Now, if you look at many 14 different assays such as the Ames assay 15 which uses bacteria to assess 16 mutagenicity, you are not going to see 17 that as a possibility for talc because 18 the bacteria cannot engulf the particle 19 and the particle needs to be ingested in 20 order to show mutagenesis. 21 Q. Doctor, on Page 4 above your 22 section "fibrous talc" -- 23 A. I see it. 24 Q. -- you refer to particle</p>

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<p>1 size for talc.</p> <p>2 A. That's correct.</p> <p>3 Q. Is knowing particle size</p> <p>4 part of your methodology for your</p> <p>5 opinions in your report?</p> <p>6 A. I'm sorry. I don't</p> <p>7 understand what you mean by was it part</p> <p>8 of my methodology.</p> <p>9 Q. Well, what is the threshold</p> <p>10 size of a talc particle to establish</p> <p>11 biologic plausibility?</p> <p>12 MS. O'DELL: Object to form.</p> <p>13 THE WITNESS: I don't think</p> <p>14 you can answer that question.</p> <p>15 In -- let me say this.</p> <p>16 In doing my methodology and</p> <p>17 accumulating literature, I -- as I</p> <p>18 said, I binned or siloed</p> <p>19 individual things.</p> <p>20 And one of the silos and one</p> <p>21 of the categories that I -- that I</p> <p>22 wanted to read was size. Size</p> <p>23 makes a very big difference in</p> <p>24 particles, and for example, if the</p>	<p>1 THE WITNESS: Establishing</p> <p>2 my biological plausibility was --</p> <p>3 was travel -- is traveling through</p> <p>4 migration and the ability for a --</p> <p>5 for the powder to migrate or the</p> <p>6 constituents to migrate. And --</p> <p>7 and also the ability to be</p> <p>8 inflammatory.</p> <p>9 BY MR. HEGARTY:</p> <p>10 Q. Well, what size -- what size</p> <p>11 of particle -- what size must the</p> <p>12 particle be to cause inflammation that</p> <p>13 leads to ovarian cancer?</p> <p>14 A. Particles of any --</p> <p>15 MS. O'DELL: Objection to</p> <p>16 form. You may go.</p> <p>17 THE WITNESS: Particles of</p> <p>18 any size can cause inflammation.</p> <p>19 BY MR. HEGARTY:</p> <p>20 Q. What about talc particles,</p> <p>21 what size of talc particle must there be</p> <p>22 to cause inflammation?</p> <p>23 A. Talc particles of any size</p> <p>24 can cause inflammation.</p>
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<p>1 particle is greater than</p> <p>2 10 microns it's going to be what</p> <p>3 we call inhalable as opposed to</p> <p>4 respirable. So where a particle</p> <p>5 can go in terms of, and now I'm</p> <p>6 using the lung as an example,</p> <p>7 where the particle can go will</p> <p>8 depend upon its size and how long</p> <p>9 it will remain in a tissue.</p> <p>10 So in my bins, in my silos</p> <p>11 were -- certainly size was a</p> <p>12 parameter.</p> <p>13 BY MR. HEGARTY:</p> <p>14 Q. And what is the threshold</p> <p>15 size of a talc particle to establish</p> <p>16 biologic plausibility between talc and</p> <p>17 ovarian cancer?</p> <p>18 MS. O'DELL: Objection to</p> <p>19 the form.</p> <p>20 BY MR. HEGARTY:</p> <p>21 Q. What size must the particle</p> <p>22 be?</p> <p>23 MS. O'DELL: Objection to</p> <p>24 form.</p>	<p>1 Q. And is there --</p> <p>2 A. However, there are</p> <p>3 differences, from reading the literature,</p> <p>4 that indicates that the smaller the</p> <p>5 particle the greater the inflammation.</p> <p>6 And that's universally</p> <p>7 known.</p> <p>8 Q. Was part of your analysis,</p> <p>9 did you -- did that involve investigating</p> <p>10 biologic plausibility as it relates to</p> <p>11 particle size?</p> <p>12 A. That was -- that was part of</p> <p>13 my reading and part of my -- my thought</p> <p>14 process, my gathering of information,</p> <p>15 yes.</p> <p>16 Q. And is there a certain size</p> <p>17 of particle necessary to establish</p> <p>18 biologic plausibility under your opinion?</p> <p>19 MS. O'DELL: Objection.</p> <p>20 Asked and answered.</p> <p>21 THE WITNESS: Well, I do</p> <p>22 think I answered that question.</p> <p>23 But again there's really --</p> <p>24 apart -- it is not just particle</p>

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<p>1 size which is important in 2 producing an inflammation. It is 3 many parameters. And so there was 4 no one size or one cutoff that 5 induces inflammation or does not. 6 It's chemical composition, it's 7 shape of the particle, it's 8 bioavailability of the particle. 9 BY MR. HEGARTY: 10 Q. Can you cite for me the -- 11 the particle size for Johnson's Baby 12 Powder over the last 120 years? 13 MS. O'DELL: Objection to 14 form. 15 THE WITNESS: I'm not sure I 16 can cite it over the last 17 120 years. But I can tell you 18 from the information in the 19 documents that I -- that I 20 reviewed, that particle size goes 21 from above 50 microns, 22 micrometers, microns, down to 23 0.3 micron with an average size of 24 10.5 to 11.5 depending on the</p>	<p>1 Q. Well, fibrous talc is only 2 talc that grows in an -- in an 3 asbestiform habit, correct? 4 A. Fibrous talc refers to the 5 shape and the longitudinal direction of 6 the fibers. That's what fibrous talc is, 7 and asbestiform refers to the same 8 longitudinal pattern of the particular 9 fibrils and -- to form a bundle or to 10 form a fiber. 11 Q. So you don't agree that 12 fibrous talc is only talc that grows in 13 an asbestiform habit? 14 MS. O'DELL: Objection to 15 form. 16 THE WITNESS: Fibrous talc 17 by its very nature is saying that 18 it grows in an asbestiform-like 19 phenotype or asbestiform-like 20 morphology. That's the nature of 21 asbestiform. 22 Asbestiform is a form. 23 BY MR. HEGARTY: 24 Q. You state in the middle</p>
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<p>1 document that you read. So an 2 average or median size. 3 BY MR. HEGARTY: 4 Q. So did you -- did you do 5 analysis for biologic plausibility 6 purposes of every size of talc particle? 7 MS. O'DELL: Objection. 8 Asked and answered. 9 THE WITNESS: Did I do 10 analysis -- I -- no, as I said, I 11 gave you the size of the -- of the 12 talcum that was reviewed, that I 13 reviewed within the documents. 14 BY MR. HEGARTY: 15 Q. You, on -- on page -- strike 16 that. 17 Under the section Fibrous 18 Talc, you say that -- is it your 19 testimony that -- strike that. 20 Is it your opinion that 21 asbestiform talc is also called fibrous 22 talc? 23 A. Talc and asbestos are -- are 24 different minerals.</p>	<p>1 paragraph, in that section, that talc in 2 its fibrous form has been classified by 3 IARC as Group I, a known carcinogen. 4 That's not correct, is it? 5 MS. O'DELL: Objection to 6 form. 7 THE WITNESS: I'm sorry, 8 could you say again? 9 BY MR. HEGARTY: 10 Q. Well, you agree that only 11 talc containing asbestiform fibers has 12 been classified as Group I by IARC, 13 correct? 14 A. Are you referring to in 2010 15 IARC expanded or -- I'm sorry, in its 16 fibrous form, talc has been classified as 17 a Group I known carcinogen? 18 Q. Correct. 19 A. Asbestiform fibers have been 20 listed by IARC as a carcinogen. 21 Q. A talc containing 22 asbestiform fibers is the only form of 23 talc that's been designated as a class -- 24 as a Category I carcinogen by IARC,</p>

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<p>1 correct?</p> <p>2 A. It's not the only one that's</p> <p>3 been associated with it, but for the</p> <p>4 purpose of my report that I put down,</p> <p>5 it's the asbestiform that has been</p> <p>6 classified by the IARC.</p> <p>7 Q. Well, it's talc containing</p> <p>8 asbestiform fibers, correct?</p> <p>9 MS. O'DELL: Objection to</p> <p>10 form.</p> <p>11 THE WITNESS: It's -- it's</p> <p>12 fibrous talc.</p> <p>13 BY MR. HEGARTY:</p> <p>14 Q. Is that -- that's your --</p> <p>15 your -- it's your opinion that IARC's</p> <p>16 designation in 2012 is of asbestiform</p> <p>17 talc?</p> <p>18 A. Their designations is</p> <p>19 form -- is talc fibers, which are</p> <p>20 asbestiform in nature.</p> <p>21 Q. Do you cite to any published</p> <p>22 data in the medical literature that</p> <p>23 asbestiform talc has been found in</p> <p>24 Johnson's Baby Powder?</p>	<p>1 Can you cite for me any published medical</p> <p>2 literature finding asbestiform talc in</p> <p>3 Johnson's Baby Powder?</p> <p>4 A. Page 6 of my report speaks</p> <p>5 of the Crowley report, and that the fiber</p> <p>6 content ranged from 8 percent to</p> <p>7 30 percent. And that Pooley and Rohl</p> <p>8 analyzed 27 talc powders and detected</p> <p>9 tremolite fibers in three samples.</p> <p>10 Q. Is it your testimony that</p> <p>11 Crowley -- Crowley's article refers to</p> <p>12 Johnson's Baby Powder?</p> <p>13 A. I would have to see the</p> <p>14 article.</p> <p>15 Q. How about Pooley and Rohl,</p> <p>16 do they refer to Johnson's Baby Powder?</p> <p>17 A. I would have to see the</p> <p>18 article.</p> <p>19 Q. In the end, for purposes of</p> <p>20 your opinion as to asbestos and talc,</p> <p>21 you're relying on the report of Longo and</p> <p>22 Rigler, correct?</p> <p>23 MS. O'DELL: Objection to</p> <p>24 form.</p>
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<p>1 A. I'm sorry.</p> <p>2 You cite -- do you cite to</p> <p>3 any published data in the medical</p> <p>4 literature that asbestiform talc...</p> <p>5 The documents, the published</p> <p>6 documents within Johnson & Johnson and</p> <p>7 the Longo report, Longo's 2017, as well</p> <p>8 as 2018 supplement from December, shows</p> <p>9 asbestiform fibers.</p> <p>10 Q. My question though is can</p> <p>11 you cite any data published in the</p> <p>12 medical literature that has found</p> <p>13 asbestiform talc in Johnson's Baby</p> <p>14 Powder?</p> <p>15 A. I thought I just did in</p> <p>16 terms of the Longo report.</p> <p>17 Q. Is the Longo report</p> <p>18 published in the medical literature?</p> <p>19 A. It's -- I'm not sure whether</p> <p>20 it's accessible in the medical -- medical</p> <p>21 literature at this point. But I'm sure</p> <p>22 it could be gathered.</p> <p>23 Q. My -- my question is solely</p> <p>24 as to the published medical literature.</p>	<p>1 THE WITNESS: No, I rely on</p> <p>2 the scientific literature, not on</p> <p>3 any one paper. I used weight of</p> <p>4 evidence to come to my opinion.</p> <p>5 BY MR. HEGARTY:</p> <p>6 Q. Did you include in your</p> <p>7 weighing of evidence the expert reports</p> <p>8 of Longo and Rigler?</p> <p>9 A. I read the Longo supplement</p> <p>10 2018 after I wrote the report.</p> <p>11 Q. For purposes -- for purposes</p> <p>12 of the opinions again in this case, do</p> <p>13 you rely in any way on the Longo and</p> <p>14 Rigler reports?</p> <p>15 MS. O'DELL: Objection to</p> <p>16 form.</p> <p>17 THE WITNESS: I'm not sure I</p> <p>18 understand your question. As I</p> <p>19 said, I wrote the report on</p> <p>20 November 16th. I read the Longo</p> <p>21 supplement report in -- about two</p> <p>22 weeks ago.</p> <p>23 BY MR. HEGARTY:</p> <p>24 Q. But you cite in your report</p>

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<p>1 the -- the MDL report of Longo and 2 Rigler, correct? 3 A. What page is that please? 4 Q. At the end of Exhibit B. 5 A. I -- okay. 6 Excuse me. I referred to 7 Longo on page -- there is no page. 8 Sorry. 9 The cosmetic talc in the 10 Lancet and cosmetic talc in -- and 11 ovarian cancer in the Lancet. Those are 12 very early papers which I -- which I 13 reviewed. Those papers were considered. 14 The latest papers from Longo were not 15 considered in my report. 16 Q. Are you talking about the 17 latest -- 18 A. 2017, 2018. They were not 19 read until after the report was 20 finalized. 21 Q. Do you know Longo and 22 Rigler? 23 A. Not at all. 24 THE VIDEOGRAPHER: Doctor,</p>	<p>1 use, the polarized light 2 microscopy and the TEM all seem to 3 be the way he describes it. His 4 methodologies were spot on in 5 terms of what other people do. 6 BY MR. HEGARTY: 7 Q. Are you an expert in XRD? 8 A. As I stated, I worked with 9 people who used the instrumentation. An 10 expert, again, I'm not sure what you mean 11 by expert. Have I done XRD on my own, 12 no. But in our department we have 13 numerous people who -- who use that 14 instrumentation. 15 Q. Are you an expert in TEM? 16 A. I have done TEM for my Ph.D. 17 thesis. 18 Q. Have you do TEM -- have you 19 ever done TEM to detect asbestos? 20 A. I have not done TEM to 21 detect asbestos. But I looked at his 22 methodologies, his study design, and the 23 instruments that he used. And they are 24 state of the art.</p>
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<p>1 can you raise your microphone up? 2 THE WITNESS: Oh, sure. 3 BY MR. HEGARTY: 4 Q. Did you do anything to 5 assess their expertise in this area? 6 A. I -- I -- 7 MS. O'DELL: Are you 8 referring to Dr. Longo and 9 Dr. Rigler? 10 MR. HEGARTY: Yes. 11 THE WITNESS: I read the -- 12 the bio sketch, a brief, very 13 brief bio sketch of Ray Longo. 14 And I looked up his credentials in 15 terms of how long he's been in 16 the -- in this company, how he 17 started this company or at least 18 was president of this company for 19 a short period of time. 20 From what I know of my own 21 work in the laboratory and working 22 with other chemists and technical 23 instrumentation people in the 24 laboratory, I -- the XRD that they</p>	<p>1 Q. Have you ever performed the 2 test that he describes in his articles or 3 reports? 4 A. I have used polarized light 5 microscopy. 6 Q. That's not my question. My 7 question is have you performed the same 8 tests in your lab or in any -- in your 9 experience that he has performed and 10 reported on in his reports? 11 A. Personally, no. 12 Q. Starting on Page 5, you talk 13 about asbestos. 14 A. Page 5 of what? 15 Q. Of your report. 16 A. Thank you. 17 Q. Is it your opinion that any 18 amount of exposure to asbestos, even to a 19 single fiber, can cause disease? 20 A. From the scientific 21 literature it is -- it appears -- it 22 appears pretty conclusive that there is 23 no threshold for the amount of 24 asbestiform asbestos that is needed to at</p>

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<p>1 least start a disease process.</p> <p>2 Q. Before being contacted by</p> <p>3 counsel for plaintiffs in this case, had</p> <p>4 you read any literature concerning</p> <p>5 asbestos and ovarian cancer?</p> <p>6 A. I have not read literature</p> <p>7 prior to that on asbestos and ovarian</p> <p>8 cancer. However, I am familiar with, as</p> <p>9 I said, other particles, other dusts,</p> <p>10 other fibers that I have worked with in</p> <p>11 the laboratory.</p> <p>12 Q. Had you even heard of a link</p> <p>13 between asbestos and ovarian cancer</p> <p>14 before being contacted by plaintiffs'</p> <p>15 counsel?</p> <p>16 A. Yes.</p> <p>17 Q. Where did you hear that</p> <p>18 from?</p> <p>19 A. Discussed it with my</p> <p>20 colleagues. As I said, I've listened to</p> <p>21 the media on discussing it. And my</p> <p>22 colleagues are a very good source,</p> <p>23 although they do not do this work in</p> <p>24 their laboratory, we all try to keep up</p>	<p>1 THE WITNESS: I don't think</p> <p>2 that's -- I don't think that's --</p> <p>3 I don't personally think that's</p> <p>4 the question.</p> <p>5 The question is, asbestos is</p> <p>6 well classified, well known as a</p> <p>7 Class 1 carcinogen by IARC. And</p> <p>8 one fiber has the potential to</p> <p>9 initiate the biological processes</p> <p>10 or provides biological</p> <p>11 plausibility that there, in fact,</p> <p>12 by producing inflammation and</p> <p>13 producing reactive oxygen</p> <p>14 intermediates, one fiber can start</p> <p>15 the process for ovarian cancer.</p> <p>16 And again, let me just</p> <p>17 repeat that my mission, my</p> <p>18 question that was asked, was to</p> <p>19 provide biological plausibility</p> <p>20 for talc, not to define causation</p> <p>21 as an epidemiologist.</p> <p>22 BY MR. HEGARTY:</p> <p>23 Q. So it's your opinion that a</p> <p>24 single fiber of asbestos in talc can</p>
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<p>1 with the latest emerging scientific</p> <p>2 debates.</p> <p>3 Q. What is the minimum number</p> <p>4 of asbestos fibers necessary to cause</p> <p>5 ovarian cancer?</p> <p>6 A. Can -- do you mean -- I said</p> <p>7 that there is really no threshold. And</p> <p>8 it can be one fiber. It depends on the</p> <p>9 individual and the susceptibilities and</p> <p>10 the vulnerabilities of that particular</p> <p>11 individual.</p> <p>12 Q. So it's your opinion that</p> <p>13 one fiber of asbestos can cause ovarian</p> <p>14 cancer?</p> <p>15 A. Under certain conditions,</p> <p>16 yes, it is my opinion.</p> <p>17 Q. Can you cite for me any</p> <p>18 authority for that opinion specific to</p> <p>19 one fiber?</p> <p>20 MS. O'DELL: Object to form.</p> <p>21 BY MR. HEGARTY:</p> <p>22 Q. And ovarian cancer.</p> <p>23 MS. O'DELL: Object to the</p> <p>24 form.</p>	<p>1 establish biological plausibility between</p> <p>2 talc and ovarian cancer?</p> <p>3 A. My --</p> <p>4 MS. O'DELL: Object to the</p> <p>5 form.</p> <p>6 THE WITNESS: My opinion is</p> <p>7 that a single fiber can induce</p> <p>8 inflammation and reactive oxygen</p> <p>9 species and can change the cell</p> <p>10 into a pro-oxidant cell that</p> <p>11 starts the process for ovarian</p> <p>12 cancer.</p> <p>13 BY MR. HEGARTY:</p> <p>14 Q. Do you agree that there are</p> <p>15 background rates of asbestos in certain</p> <p>16 areas?</p> <p>17 A. Do you mean in the air?</p> <p>18 Q. In the air?</p> <p>19 A. In the air, it depends on</p> <p>20 that area. If that's an area where</p> <p>21 there's mining or there's a house being</p> <p>22 redone from the 1970s or 19 -- early '80s</p> <p>23 that might have used asbestos, then there</p> <p>24 will be asbestos in the air. But not</p>

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<p>1 sitting in this room, unless there is</p> <p>2 asbestos in the walls, which I doubt</p> <p>3 because it was only built about ten years</p> <p>4 ago.</p> <p>5 Q. Do the background rates of</p> <p>6 asbestos in certain areas cause ovarian</p> <p>7 cancer?</p> <p>8 A. Asbestos has been shown to</p> <p>9 cause ovarian cancer by inhalation, yes.</p> <p>10 Q. Is it your opinion that</p> <p>11 background rates of asbestos in the air</p> <p>12 can cause ovarian cancer?</p> <p>13 MS. O'DELL: Object to the</p> <p>14 form.</p> <p>15 THE WITNESS: I don't --</p> <p>16 again, background rates, it has</p> <p>17 been shown that workers that are</p> <p>18 in places where asbestos is made</p> <p>19 have a higher incidence of lung</p> <p>20 cancer as shown by Dr. Selikoff</p> <p>21 many, many years ago.</p> <p>22 BY MR. HEGARTY:</p> <p>23 Q. Doctor, you know what a</p> <p>24 background rate of -- background level of</p>	<p>1 A. It depends. After the World</p> <p>2 Trade Center, there was.</p> <p>3 Q. Are those background</p> <p>4 levels -- do those background levels</p> <p>5 cause ovarian cancer?</p> <p>6 MS. O'DELL: Objection to</p> <p>7 the form.</p> <p>8 THE WITNESS: The studies</p> <p>9 that have been done by my</p> <p>10 colleagues in the aftermath of the</p> <p>11 World Trade Center disaster where</p> <p>12 asbestos was generated have not at</p> <p>13 this time -- and New York City</p> <p>14 Public Health has not at this time</p> <p>15 looked at ovarian cancer. Ovarian</p> <p>16 cancer occurs within 10 to 30, up</p> <p>17 to 40 years later. So since 9/11</p> <p>18 was only 2001, there is -- there</p> <p>19 is not sufficient time to have</p> <p>20 developed ovarian cancer.</p> <p>21 BY MR. HEGARTY:</p> <p>22 Q. Doctor, before 9/11 there</p> <p>23 were background levels of asbestos in</p> <p>24 certain parts of New York City, correct?</p>
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<p>1 a particle in air is, right?</p> <p>2 A. Yes, sir, I do.</p> <p>3 Q. Okay. And is it your</p> <p>4 opinion that background levels of</p> <p>5 asbestos in the air can cause ovarian</p> <p>6 cancer?</p> <p>7 MS. O'DELL: Objection to</p> <p>8 form.</p> <p>9 THE WITNESS: As I said,</p> <p>10 sitting in this room, there should</p> <p>11 not be any background level of</p> <p>12 asbestos. So if you're talking</p> <p>13 about background level in a</p> <p>14 particular institute or industry</p> <p>15 where they're developing it, those</p> <p>16 levels are quite high, and yes, I</p> <p>17 do believe that those levels</p> <p>18 within a working environment can</p> <p>19 indeed cause inflammation that can</p> <p>20 lead to causation.</p> <p>21 BY MR. HEGARTY:</p> <p>22 Q. There are background levels</p> <p>23 of asbestos in the air in New York City,</p> <p>24 correct?</p>	<p>1 A. When there are houses that</p> <p>2 were built with it. There is -- asbestos</p> <p>3 is not just -- should not be -- unless</p> <p>4 there's a source, asbestos should not --</p> <p>5 it would not be coming from jet engines.</p> <p>6 It would not be coming from other</p> <p>7 sources. If it's there, it came from a</p> <p>8 specific source. It's like we should not</p> <p>9 have lead in our body at all. But we do</p> <p>10 because the lead came from the air where</p> <p>11 there was lead in the gasoline.</p> <p>12 So there shouldn't be</p> <p>13 background levels of asbestos just</p> <p>14 hanging around unless there's an adequate</p> <p>15 source that produced it.</p> <p>16 Q. Does EPA allow background</p> <p>17 levels of asbestos in water?</p> <p>18 A. I'm not familiar with that</p> <p>19 information. That's in water. You asked</p> <p>20 me about air.</p> <p>21 Q. I asked you a different</p> <p>22 question. I can ask you a different</p> <p>23 question, Doctor.</p> <p>24 A. I understand the question,</p>

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<p>1 yes.</p> <p>2 Q. Does EPA allow background</p> <p>3 levels of asbestos in water?</p> <p>4 A. I have not reviewed that</p> <p>5 literature.</p> <p>6 Q. As a toxicologist, you agree</p> <p>7 that dose or level of exposure determines</p> <p>8 the toxicity of substances, correct?</p> <p>9 MS. O'DELL: Object to the</p> <p>10 form.</p> <p>11 THE WITNESS: I believe that</p> <p>12 dose as well as frequency,</p> <p>13 duration, time of exposure are</p> <p>14 all -- as well as dose contribute</p> <p>15 to the toxicity of an agent.</p> <p>16 BY MR. HEGARTY:</p> <p>17 Q. You agree that a substance</p> <p>18 can produce a harmful effect only if it</p> <p>19 reaches a susceptible biological system</p> <p>20 within the body in high enough</p> <p>21 concentration, correct?</p> <p>22 MS. O'DELL: Objection to</p> <p>23 form.</p> <p>24 THE WITNESS: It depends on</p>	<p>1 not been done.</p> <p>2 There are -- there is</p> <p>3 information on no observable</p> <p>4 adverse effect level that has been</p> <p>5 established using a dose-response</p> <p>6 by the NTP, National Toxicology</p> <p>7 Program.</p> <p>8 And two milligrams of talc</p> <p>9 that they used produced minimal --</p> <p>10 minimal affects in the rats and</p> <p>11 mice that they tested. So</p> <p>12 somewhere below at least, from an</p> <p>13 inhalation perspective, is --</p> <p>14 produces no effect.</p> <p>15 However, they saw effects</p> <p>16 even at the lowest, two milligrams</p> <p>17 per.</p> <p>18 BY MR. HEGARTY:</p> <p>19 Q. My question was specific to</p> <p>20 ovarian cancer. That study did not --</p> <p>21 did not identify any ovarian cancers in</p> <p>22 the mice -- in the mice or rats, correct?</p> <p>23 A. That's not what they looked</p> <p>24 for.</p>
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<p>1 the -- let me read your question</p> <p>2 over. It was a lengthy question.</p> <p>3 It depends on the -- on the</p> <p>4 toxicant that you're talking</p> <p>5 about. There is dose that you're</p> <p>6 exposed to, or concentration that</p> <p>7 you're supposed to, and dose to</p> <p>8 the target tissue. And for every</p> <p>9 different -- every different</p> <p>10 chemical, there is a different</p> <p>11 target dose that could start a</p> <p>12 biological process.</p> <p>13 BY MR. HEGARTY:</p> <p>14 Q. And what is the target dose</p> <p>15 that is necessary to start the biologic</p> <p>16 process of talc and ovarian cancer?</p> <p>17 MS. O'DELL: Object to the</p> <p>18 form.</p> <p>19 THE WITNESS: Well, if</p> <p>20 you -- if you look at talc as a</p> <p>21 whole, to give you a</p> <p>22 concentration, a threshold</p> <p>23 concentration, I'm not sure that</p> <p>24 has been -- I don't -- that has</p>	<p>1 Q. My question is specific to</p> <p>2 ovarian cancer.</p> <p>3 A. Let me read your question</p> <p>4 over again. Could you repeat your</p> <p>5 question. It's already gone past.</p> <p>6 Q. What is the target dose that</p> <p>7 is necessary to start the biologic</p> <p>8 process of talc and ovarian cancer?</p> <p>9 A. Well, as I talked about, one</p> <p>10 fiber of asbestos could start the</p> <p>11 biological process. It is not clear if</p> <p>12 there is a threshold dose or a</p> <p>13 concentration, or whether one -- and</p> <p>14 we're talking about the whole talcum</p> <p>15 powder product. We're not talking about</p> <p>16 any one product. You're talking about</p> <p>17 the whole process and how much it will</p> <p>18 start the biological process.</p> <p>19 It's unknown, it's not in</p> <p>20 the literature. But I will tell you that</p> <p>21 even small doses that are used of the</p> <p>22 talcum -- of a talcum product, if you</p> <p>23 take a woman who takes a handful, if you</p> <p>24 take a woman that takes a little bit on a</p>

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<p>1 powder puff, that amount could even, 2 depending upon the woman, the 3 susceptibility, the vulnerability, can 4 all start the process. 5 We're talking about the 6 process, in my opinion. What you're 7 talking about and in the opinion that I 8 report here, is that that can start an 9 inflammatory process. 10 Q. And what is the number of 11 particles of talc necessary to start the 12 biologic process? 13 MS. O'DELL: Object to form. 14 THE WITNESS: That is not in 15 the scientific literature. 16 BY MR. HEGARTY: 17 Q. Over Pages 6 through 8 of 18 your report you discuss asbestos. Is the 19 presence of asbestos in talc necessary 20 for your biologic plausibility opinions? 21 A. I looked at the entire 22 product. 23 Q. Well, do you intend to 24 testify that there is biologic</p>	<p>1 THE WITNESS: Can -- can you 2 address the question again? 3 BY MR. HEGARTY: 4 Q. Is it your opinion that pure 5 talc does not exist? 6 When I say pure talc, I mean 7 talc without asbestos, without heavy 8 metals, without fragrance. 9 MS. O'DELL: Objection to 10 form. 11 THE WITNESS: The idea of 12 talc is that it has, within its 13 lattice, metals. 14 So platy talc refers to the 15 structure or the morphology of the 16 talc, how it looks, what 17 dimensions it's in. 18 So, do I think there is 19 platy talc? Of course there is 20 platy talc. 21 BY MR. HEGARTY: 22 Q. Is there platy talc without 23 asbestos? 24 A. Well, according to the</p>
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<p>1 plausibility between pure talc, the platy 2 talc, and ovarian cancer? 3 MS. O'DELL: Object to the 4 form. 5 THE WITNESS: I don't 6 think -- my opinion is that there 7 may not be anything such as platy 8 talc in a pure form. 9 BY MR. HEGARTY: 10 Q. Okay. It's your opinion 11 that pure talc does not exist? 12 MS. O'DELL: I'm not sure 13 she -- she finished her answer. 14 Had you finished, Doctor, 15 before? 16 THE WITNESS: I actually 17 need a little water. 18 MS. O'DELL: Okay. Sure. 19 Had you finished your answer 20 before the second question was 21 asked? 22 THE WITNESS: No. 23 MS. O'DELL: Okay. You may 24 finish.</p>	<p>1 studies out of Mossman's laboratories, 2 they used asbestos, they used talc that 3 contained nonfibrous talc. 4 Q. Do you have an opinion on 5 whether there is talc without asbestos? 6 MS. O'DELL: Object to the 7 form. 8 THE WITNESS: In many of the 9 documents from Johnson & Johnson, 10 they measured fibrous talc as well 11 as other forms, non-asbestiform, 12 and they -- they found that there 13 were samples, individual samples 14 that they reported as 15 nondetectable as having 16 asbestiform talc. 17 BY MR. HEGARTY: 18 Q. Well, do you have an opinion 19 of whether there is talc without 20 asbestos? 21 A. It depends where -- where 22 it's mined. If it's mined in an area 23 where people were extremely cautious, 24 there could be.</p>

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<p>1 Q. Did you do analysis of 2 biologic plausibility for talc without 3 asbestos? 4 MS. O'DELL: Objection to 5 form. 6 THE WITNESS: My biological 7 assessment, my -- my biological 8 plausibility was looking at the 9 entire product of talcum powder. 10 BY MR. HEGARTY: 11 Q. And how do you define the 12 entire product? 13 A. The entire product is 14 whatever are the ingredients or listed 15 within the documents or the test results 16 from Imerys that -- that indicate what 17 they measured, including the metals, the 18 asbestos, the -- the asbestiform fibers, 19 the fragrances. 20 Q. So you did your biologic 21 plausibility analysis with -- based on 22 talc that has asbestos, heavy metals and 23 fragrance in it, correct? 24 MS. O'DELL: Objection to</p>	<p>1 sure how that would be done or I 2 don't think it could be done. 3 What I did was I did it for 4 the entire product. 5 BY MR. HEGARTY: 6 Q. And what do you -- what do 7 you think -- what is your opinion -- 8 strike that. 9 What is in the entire 10 product in your opinion? 11 A. Based upon the Johnson & 12 Johnson documents. That's where my -- 13 that's where I will tell you what is in 14 there. 15 As -- as far as the product 16 documents, it indicates that there are 17 metals, including -- not -- not totally 18 inclusive of, but to mention a few of the 19 more well-known ones, cobalt, chromium 20 and nickel. 21 There are also, according to 22 the Crowley report, there are also many 23 chemicals that make up a fragrance. And 24 there -- and in many of the samples</p>
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<p>1 form. 2 THE WITNESS: I did my 3 biological plausibility on talcum 4 powder products. 5 I looked at individual 6 products, individual constituents 7 in adding to my -- to my report, 8 to my document. But I looked at 9 the entire product. And it is my 10 opinion that the entire product 11 causes inflammation and that 12 inflammation then goes on as a 13 triggering mechanism to turn on 14 certain genes and to bind iron 15 that can lead to the changes 16 needed for cancer in the ovary. 17 BY MR. HEGARTY: 18 Q. You did not do a separate 19 analysis of talc without asbestos or 20 without -- and without heavy metals and 21 without fragrance, correct? 22 MS. O'DELL: Object to the 23 form. 24 THE WITNESS: I'm not even</p>	<p>1 tested, there was asbestos or asbestiform 2 fibers, some of which were called fibrous 3 talc, others were called asbestiform and 4 others in which they were called asbestos 5 fibers, or amphiboles or anthophyllite. 6 Q. Did you review all the 7 test -- 8 A. Anthophyllite. 9 Q. I'm sorry. 10 Did you review all the 11 testing documents produced by Johnson & 12 Johnson and Imerys in this case? 13 A. I reviewed the documents 14 that are in the production document black 15 binder to my right. 16 Q. Those were provided to you 17 by plaintiffs' counsel, correct? 18 A. That is correct. 19 Q. Did you ask them if they 20 provided to you all testing documents 21 that had been produced in this case with 22 regard -- by Johnson & Johnson and 23 Imerys? 24 A. I did not ask that question</p>

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<p style="text-align: right;">Page 274</p> <p>1 specifically.</p> <p>2 Q. Do you know whether there</p> <p>3 are additional documents of tests --</p> <p>4 documents describing tests that were done</p> <p>5 by Johnson & Johnson and/or Imerys with</p> <p>6 regard to asbestos, heavy metals,</p> <p>7 fragrances and talc?</p> <p>8 MS. O'DELL: Object to form.</p> <p>9 THE WITNESS: Plaintiff</p> <p>10 counsels and myself did talk about</p> <p>11 that, some of that information,</p> <p>12 and --</p> <p>13 MS. O'DELL: Doctor,</p> <p>14 don't -- in terms of our</p> <p>15 conversations --</p> <p>16 THE WITNESS: I'm sorry.</p> <p>17 MS. O'DELL: -- those</p> <p>18 conversations are our work</p> <p>19 product.</p> <p>20 But to the degree that your</p> <p>21 answer doesn't depend on our</p> <p>22 conversations, you may -- you may</p> <p>23 answer.</p> <p>24 THE WITNESS: I -- I made it</p>	<p style="text-align: right;">Page 276</p> <p>1 not present.</p> <p>2 Q. You relied on plaintiffs'</p> <p>3 counsel to select for you the testing</p> <p>4 documents that you reviewed, correct?</p> <p>5 A. I -- I read and reviewed</p> <p>6 whatever they sent me.</p> <p>7 Q. And did you do anything to</p> <p>8 verify that you had all the documents</p> <p>9 regarding the testing of Johnson's Baby</p> <p>10 Powder?</p> <p>11 A. I did nothing personally</p> <p>12 other than ask the -- the attorneys if</p> <p>13 there was anything else I needed in</p> <p>14 forming my opinion. In -- of production</p> <p>15 documents, if we're just referring to</p> <p>16 that.</p> <p>17 I have no access to</p> <p>18 production documents on my own or through</p> <p>19 the internet. And I know none of the</p> <p>20 other deposees.</p> <p>21 Q. Did you do a comparison of</p> <p>22 biologic plausibility across various</p> <p>23 brands of talcum powder products?</p> <p>24 A. I did not personally do any</p>
<p style="text-align: right;">Page 275</p> <p>1 clear that I would like to see</p> <p>2 documents that could go into my</p> <p>3 assessment of biological</p> <p>4 plausibility.</p> <p>5 BY MR. HEGARTY:</p> <p>6 Q. Would you like to see</p> <p>7 documents showing that there is no</p> <p>8 asbestos in talcum powder, in particular</p> <p>9 Johnson's Baby Powder?</p> <p>10 A. I will review any documents</p> <p>11 that are provided to me, if asked to</p> <p>12 review them.</p> <p>13 Q. Did you ask plaintiffs'</p> <p>14 counsel to provide you documents of</p> <p>15 testing showing no asbestos in Johnson's</p> <p>16 Baby Powder?</p> <p>17 A. Many of those -- of the</p> <p>18 documents that are in the product</p> <p>19 production document show that there are</p> <p>20 samples that do not contain asbestos, or</p> <p>21 I will say asbestiform or talc fibers.</p> <p>22 So there is information in there showing</p> <p>23 when there is -- it is present and</p> <p>24 information in there showing when it was</p>	<p style="text-align: right;">Page 277</p> <p>1 of that. However many of the documents</p> <p>2 and many of the studies including the</p> <p>3 Longo supplement did compare, for</p> <p>4 example, I think I misspoke when I said</p> <p>5 one of the places that Johnson & Johnson</p> <p>6 gets their talc is Korea. What I meant</p> <p>7 was China. I should have said Asia. So</p> <p>8 Korea is also a mine that provided, but</p> <p>9 not to Johnson & Johnson.</p> <p>10 MS. O'DELL: Hey, Mark,</p> <p>11 we've been going about an hour and</p> <p>12 15 minutes.</p> <p>13 MR. HEGARTY: Okay.</p> <p>14 MS. O'DELL: Can we take a</p> <p>15 break?</p> <p>16 MR. HEGARTY: Yeah.</p> <p>17 THE VIDEOGRAPHER: The time</p> <p>18 is 2:27 p.m. Off the record.</p> <p>19 (Short break.)</p> <p>20 THE VIDEOGRAPHER: We are</p> <p>21 back on the record. The time is</p> <p>22 2:45 p.m.</p> <p>23 BY MR. HEGARTY:</p> <p>24 Q. Doctor, if evidence was that</p>

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<p>1 there is no asbestos in Johnson's Baby 2 Powder, would that change your opinions 3 as to biological plausibility? 4 A. No, sir, it would not. 5 Q. Same question with regard to 6 heavy metals. If there were no heavy 7 metals in Johnson's Baby Powder, would 8 that change your opinions on biological 9 plausibility? 10 A. I looked at the entire 11 product and it would not -- it would not 12 change my opinion, as it exists 13 currently, with biological plausibility 14 that it would cause ovarian cancer 15 through -- through inflammation, is my 16 opinion. 17 Q. In looking at your heavy 18 metals section, beginning at Page 8 of 19 your report -- are you there? 20 A. I'm not. I had to put my 21 glasses on. Thank you. 22 Q. There are no studies that 23 have looked at the effects of these 24 metals in powder dusted on the perineum,</p>	<p>1 ludicrous actually. 2 Q. None of the studies that you 3 cite in your heavy metals section link 4 the exposures that you discussed to 5 ovarian cancer risk, correct? 6 THE WITNESS: I'm sorry. 7 This is not coming up. 8 (Whereupon, a discussion was 9 held off the stenographic record.) 10 THE WITNESS: They -- the 11 studies that I list for the 12 individual metals talk about the 13 potential inflammatory and 14 carcinogenic potential of those 15 particular metals. And based on 16 the Crowley report, there are, and 17 other production documents from 18 Johnson & Johnson, they list three 19 particular metals that are 20 associated with Johnson & Johnson 21 products, cobalt, nickel and 22 chromium. 23 BY MR. HEGARTY: 24 Q. That was not my question.</p>
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<p>1 correct? 2 A. Your question is there are 3 no studies looking at these individual 4 metals? 5 Q. Correct? 6 A. Perineal studies in the 7 ovarian -- 8 Q. No, my question is, there 9 are no studies that looked at the effects 10 of these metals in powder dusted on the 11 perineum, correct? 12 A. I'm not sure I understand 13 your question. 14 Q. You don't cite any studies 15 that have looked at the effect of 16 applying these metals to the perineum, 17 correct? 18 A. To my knowledge, there are 19 no specific animal studies that show 20 nickel was applied to the perineal. 21 Q. There are no human studies 22 either, correct? 23 A. To my knowledge, there are 24 no human studies. That would be</p>	<p>1 My question is, none of the studies that 2 you cite -- 3 A. On the -- 4 Q. -- in your section on heavy 5 metals, evaluate ovarian carcinogenicity 6 potentials of these metals, correct? 7 MS. O'DELL: Object to the 8 form. 9 THE WITNESS: I do not talk 10 about ovarian cancer in particular 11 relation to these three metals 12 that I cited -- 13 BY MR. HEGARTY: 14 Q. No studies -- 15 A. -- in the report. 16 Q. -- that you cite refer to 17 risk of ovarian cancer with exposure to 18 these metals, correct? 19 A. With my charge being 20 biological plausibility, I thought that 21 it was my opinion -- my professional 22 opinion is that it was more important to 23 discuss the potential for inflammatory 24 responsiveness and carcinogenic</p>

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<p style="text-align: right;">Page 282</p> <p>1 potential.</p> <p>2 Q. Doctor, you don't cite any</p> <p>3 studies that look at -- look at the</p> <p>4 ovarian carcinogenicity potential of any</p> <p>5 of these metals, correct?</p> <p>6 MS. O'DELL: Object to form.</p> <p>7 THE WITNESS: Not in my</p> <p>8 report.</p> <p>9 BY MR. HEGARTY:</p> <p>10 Q. What are the exposure levels</p> <p>11 of these metals necessary to have</p> <p>12 biologic plausibility of ovarian cancer?</p> <p>13 A. As far as biological</p> <p>14 plausibility of these metals, these</p> <p>15 metals are -- unless there are particular</p> <p>16 standards for a particular metal, nothing</p> <p>17 is really established for what it would</p> <p>18 take for nickel to cause ovarian cancer.</p> <p>19 However, the ability of</p> <p>20 these metals to produce inflammation are</p> <p>21 very, very low levels. And if they</p> <p>22 produce inflammation, then they have the</p> <p>23 potential to go on to produce cancer.</p> <p>24 And many of these metals do.</p>	<p style="text-align: right;">Page 284</p> <p>1 them.</p> <p>2 Q. Did you find any?</p> <p>3 A. Again, the purpose of</p> <p>4 writing this section on heavy metals had</p> <p>5 to do with bringing out the inflammatory</p> <p>6 and the biological plausibility that in</p> <p>7 my mind is linked to talc and ovarian</p> <p>8 cancer.</p> <p>9 Q. Doctor, listen to my</p> <p>10 question. Did you find any studies</p> <p>11 reporting on a risk of ovarian cancer</p> <p>12 with exposure to any of those metals?</p> <p>13 MS. O'DELL: Objection to</p> <p>14 form.</p> <p>15 THE WITNESS: I found in</p> <p>16 cobalt, but it does not have to do</p> <p>17 with ovarian cancer, but I did</p> <p>18 find that the absorption of cobalt</p> <p>19 is much higher in women than in</p> <p>20 men. And that many of these</p> <p>21 studies show that you have</p> <p>22 increased proliferation. And as I</p> <p>23 said, mine was -- my question that</p> <p>24 I needed to address was biological</p>
<p style="text-align: right;">Page 283</p> <p>1 Q. Well, none of these studies</p> <p>2 report a threshold level of exposure to</p> <p>3 cobalt, chromium, or nickel to increase</p> <p>4 the risk of ovarian cancer, correct?</p> <p>5 MS. O'DELL: Object to the</p> <p>6 form.</p> <p>7 THE WITNESS: That was not</p> <p>8 the purpose of my writing.</p> <p>9 My -- my writing was to</p> <p>10 exemplify the carcinogenic</p> <p>11 potential and the inflammatory and</p> <p>12 some of the human health effects</p> <p>13 that are commonly seen. Ovarian</p> <p>14 cancer is not that common. And so</p> <p>15 it's not unusual that other --</p> <p>16 that ovarian cancer was not looked</p> <p>17 into in some of these studies.</p> <p>18 BY MR. HEGARTY:</p> <p>19 Q. Well, you found no studies</p> <p>20 looking at exposure to any of those</p> <p>21 metals and risk of ovarian cancer,</p> <p>22 correct?</p> <p>23 A. It's not that I didn't find</p> <p>24 any. I wasn't particularly looking for</p>	<p style="text-align: right;">Page 285</p> <p>1 plausibility.</p> <p>2 So I did find many of these</p> <p>3 factors, many of these metals, all</p> <p>4 of these metals have the potential</p> <p>5 to produce the changes that are in</p> <p>6 the carcinogenic process.</p> <p>7 BY MR. HEGARTY:</p> <p>8 Q. I'm going to ask the</p> <p>9 question one more time. And if we don't</p> <p>10 get an answer I'm going to call Judge</p> <p>11 Pisano.</p> <p>12 Cite for me, which study did</p> <p>13 you find that linked exposure to these</p> <p>14 metals to ovarian cancer?</p> <p>15 MS. O'DELL: Objection to</p> <p>16 the form.</p> <p>17 Dr. Zelikoff has answered</p> <p>18 your question multiple times.</p> <p>19 But you may answer it again.</p> <p>20 BY MR. HEGARTY:</p> <p>21 Q. Let me ask it differently.</p> <p>22 Did you find any studies reporting on a</p> <p>23 risk of ovarian cancer with exposure to</p> <p>24 any of these metals, that being cobalt,</p>

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<p>1 chromium, or nickel?</p> <p>2 A. I was not looking</p> <p>3 specifically for that. So, no, I did not</p> <p>4 find that.</p> <p>5 Q. Which of the studies that</p> <p>6 you report show that the exposure levels</p> <p>7 evaluated in those studies are in any way</p> <p>8 related to human exposure levels through</p> <p>9 Johnson's Baby Powder?</p> <p>10 MS. O'DELL: Object to the</p> <p>11 form.</p> <p>12 THE WITNESS: Are you</p> <p>13 talking about inhalation or</p> <p>14 perineal application?</p> <p>15 BY MR. HEGARTY:</p> <p>16 Q. Either method of exposure.</p> <p>17 A. So many of the inhalation</p> <p>18 numbers are concentrations, and looking</p> <p>19 at the Johnson & Johnson documents in</p> <p>20 terms of what is in the head and in the</p> <p>21 face area after diapering as well as</p> <p>22 during powdering, indicates that the</p> <p>23 concentrations that are possibly inhaled</p> <p>24 contain particles that can initiate a</p>	<p>1 of these metals in terms of parts</p> <p>2 per million, whatever talc reached</p> <p>3 there, there's -- there is a</p> <p>4 strong potential that that amount</p> <p>5 of the concentration of the metal</p> <p>6 would also reach the target organ.</p> <p>7 BY MR. HEGARTY:</p> <p>8 Q. That's not my question,</p> <p>9 Doctor.</p> <p>10 How much nickel, cobalt and</p> <p>11 chromium reached the ovary with a single</p> <p>12 application of Johnson's Baby Powder to</p> <p>13 the perineum?</p> <p>14 A. I don't have -- that</p> <p>15 information is not available.</p> <p>16 They did show in studies, in</p> <p>17 a few studies, I think it was the</p> <p>18 Hamilton study that -- or Henderson</p> <p>19 study -- that there -- talc indeed does</p> <p>20 reach the ovary from perineal application</p> <p>21 or from intravaginal application. And</p> <p>22 whatever is -- whatever the concentration</p> <p>23 is that reached the ovary, carried with</p> <p>24 it these -- one -- one or more or all of</p>
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<p>1 response.</p> <p>2 Also, from looking at the</p> <p>3 Johnson & Johnson documents, many of</p> <p>4 those results indicate -- and I think we</p> <p>5 have an exhibit here of the table of the</p> <p>6 concentrations that were found.</p> <p>7 Well, it's not at my local</p> <p>8 fingertips here. But --</p> <p>9 MS. O'DELL: Are you looking</p> <p>10 for Exhibit C, Doctor, I think</p> <p>11 it's right there with -- on</p> <p>12 your -- on your paper clip.</p> <p>13 MR. HEGARTY: Let me</p> <p>14 withdraw the question.</p> <p>15 BY MR. HEGARTY:</p> <p>16 Q. Doctor, how much nickel,</p> <p>17 cobalt and chromium reach the ovary with</p> <p>18 one application of Johnson's Baby Powder</p> <p>19 to the perineum?</p> <p>20 MS. O'DELL: Object to the</p> <p>21 form.</p> <p>22 THE WITNESS: Since much of</p> <p>23 the -- since Johnson's Baby Powder</p> <p>24 has a high concentrations of some</p>	<p>1 these three metals.</p> <p>2 Q. You agree --</p> <p>3 A. So it was a similar</p> <p>4 concentration.</p> <p>5 Q. You agree that all of the</p> <p>6 metals you talk about are in -- are all</p> <p>7 around us, they are in food, correct?</p> <p>8 A. The metals nickel, chromium,</p> <p>9 cobalt can be in food, yes.</p> <p>10 Q. They are in the air,</p> <p>11 correct?</p> <p>12 A. They are in certain ambient</p> <p>13 environments.</p> <p>14 Q. These are metals that are</p> <p>15 considered ubiquitous, correct?</p> <p>16 MS. O'DELL: Objection to</p> <p>17 the form.</p> <p>18 THE WITNESS: They are --</p> <p>19 chromium not as much -- I'm sorry,</p> <p>20 cobalt not as much. But chromium</p> <p>21 and nickel, they are in the air,</p> <p>22 and depending upon the environment</p> <p>23 that is producing it, if you go to</p> <p>24 Sundre, Canada, you can have lots</p>

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<p>1 of nickel in the air. But if you 2 go to New York City, concentrate 3 as we've measured in my laboratory 4 prior to this deposition, or prior 5 to this case, my involvement in 6 this case, you will see very small 7 concentrations of nickel. There 8 should not be a lot in the air. 9 And we also measured 10 chromium, and it should not be -- 11 unless you have a polluted 12 environment there should not be a 13 lot of these metals in the air. 14 BY MR. HEGARTY: 15 Q. Is the metal are not -- the 16 metals that are in the air, nickel and 17 chromium, sufficient to have biologic 18 plausibility between those metals and 19 ovarian cancer? 20 A. Those -- those metals, yes, 21 the metals in the air can cause an 22 inflammatory response. The 23 concentrations of the metals in the air 24 can cause an inflammatory response and</p>	<p>1 Q. Did you do an analysis 2 yourself of Johnson's Baby Powder for the 3 presence of these heavy metals? 4 A. I did not do any 5 instrumentation studies measuring the 6 amount. I -- I relied on the documents. 7 Q. But you are capable of doing 8 that analysis, correct? 9 A. We are capable, in my 10 laboratory, along with colleagues, of 11 measuring by XRF, x-ray fluorescence, and 12 by ICP mass spec, measuring the amounts 13 of metals in tissues, correct. 14 Q. But you did not do that 15 testing here, correct? 16 A. My job was to define 17 biological plausibility based upon 18 literature, relevant literature and 19 documents, internal documents. 20 Q. Nowhere in your report do 21 you identify the exposure levels of any 22 of these metals that are necessary to 23 cause ovarian cancer, correct? 24 MS. O'DELL: Objection to</p>
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<p>1 can start processes and change gene 2 expression within cells. 3 Q. Cite for me any study that 4 shows that inflammatory response has ever 5 occurred in the ovary. 6 MS. O'DELL: Objection to 7 form. 8 THE WITNESS: There are 9 granulomas that have been found in 10 animal studies of -- in the lung. 11 You are talking about in the 12 ovary, I understand that. 13 BY MR. HEGARTY: 14 Q. I'm talking about the 15 studies that have not looked at talc, but 16 have looked at cobalt, chromium -- 17 A. Okay. 18 Q. -- nickel and cobalt without 19 regard to talc, cite for me any studies 20 that have shown that those metals have 21 caused inflammation in the ovary? 22 A. By themselves, there are no 23 studies that demonstrate that, that I'm 24 aware of.</p>	<p>1 form. Asked and answered. 2 THE WITNESS: There is no 3 literature that says you need one 4 particle or ten particles. 5 The inflammatory response 6 that nickel causes is extremely 7 well established, even at very low 8 concentrations. And -- and the 9 same is true for hexavalent 10 chromium and for chromium, 11 trivalent chromium. 12 BY MR. HEGARTY: 13 Q. Are there any studies that 14 report on exposure of these metals to the 15 ovaries? 16 A. Are you talking about alone? 17 Q. Individually or together, 18 but the metals themselves. 19 A. Just the metals -- 20 MS. O'DELL: Object -- 21 objection to form. 22 THE WITNESS: These metals 23 by themselves have been tested 24 extensively in cells and in -- in</p>

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<p style="text-align: right;">Page 294</p> <p>1 animals to produce inflammation, 2 to change the epigenome of the 3 cells, to change gene expression. 4 And there was no -- there was no 5 reason to believe whether or not 6 there are specific studies 7 associated with the ovary. There 8 are no reason to believe that it 9 would not do the same effects in 10 cells as well as in the ovary, in 11 the lung, and the kidney and the 12 liver. 13 BY MR. HEGARTY: 14 Q. Doctor, you are not aware of 15 any studies that have looked at the 16 effects of these metals on human ovarian 17 cells, correct? 18 MS. O'DELL: Object to the 19 form. 20 THE WITNESS: Again, I'm not 21 an epidemiologist, so -- and I'm 22 not a clinical toxicologist. So I 23 will have to stand by the -- the 24 data that I do know in -- in</p>	<p style="text-align: right;">Page 296</p> <p>1 form. 2 THE WITNESS: The exposures 3 are similar, or can be similar. 4 But as I stated before, for 5 these metals as well as for 6 asbestiform fibers, all it takes 7 is a small amount, if not just one 8 fiber, to cause the response and 9 to start the process of 10 inflammation, gene expression, 11 upregulation of genes that are 12 associated with biological 13 mediators, proinflammatory 14 cytokines. 15 BY MR. HEGARTY: 16 Q. Yet you cite no study that 17 reports that response in human ovarian 18 cells, correct? 19 MS. O'DELL: Object to the 20 form. 21 THE WITNESS: I -- if you're 22 still talking about individual 23 metals, no. 24 But if you're talking about</p>
<p style="text-align: right;">Page 295</p> <p>1 extensive -- have extensive 2 knowledge of. And that's human ex 3 vivo and in vitro studies. And I 4 am not aware. 5 That is not to say that they 6 are not out there. And I 7 especially do not know about the 8 humans, because I focus as a 9 toxicologist. I'm an animal 10 toxicologist. 11 BY MR. HEGARTY: 12 Q. Did you do any comparison 13 between the doses of -- of the metals 14 reported in the studies that you cited to 15 those in women using talc? 16 A. I did no calculations on -- 17 on my own. 18 Q. Did you do any calculations 19 that tested these metals in animals to 20 determine what the -- that -- that they 21 relate in any way to the dose that a 22 human would experience through Johnson's 23 Baby Powder use? 24 MS. O'DELL: Objection to</p>	<p style="text-align: right;">Page 297</p> <p>1 in vitro studies like those of 2 Saed who looked for oxidative 3 stress and -- and prooxidant 4 changes, and if you are talking 5 about Shukla study who also looked 6 at ovarian cells, human ovarian 7 cells, and looked at changes in 8 gene expression associated with 9 oxidant production and reactive 10 oxygen species production, then 11 yes, in cell culture using human 12 ovarian epithelial cells, because 13 that's what we are talking about 14 here. 15 BY MR. HEGARTY: 16 Q. None of those studies 17 applied nickel to human ovarian cells, 18 did they? 19 A. No, they did not. 20 Q. None of those studies 21 applied cobalt to human ovarian cells, 22 correct? 23 A. No, they did not. 24 Q. None of those studies</p>

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<p>1 applied chromium to ovarian -- human 2 ovarian cells, correct? 3 A. Correct. But what we're 4 talk -- what I'm talking about and the 5 basis of my opinion is the product in its 6 entirety, not breaking it down to 7 individual constituents. 8 Q. Is it necessary for purposes 9 of your biologic plausibility opinion 10 that talc reach the ovary? 11 A. Not necessarily. 12 Talc does -- talc and any 13 other particle does not have to reach the 14 site of deposition. They can, and -- and 15 do, I believe that they not only migrate 16 to an area and they can get to an area 17 and then cause inflammation which then 18 can be -- the cytokines where there's 19 tumor necrosis factor, interleukin-1, or 20 any of the other proinflammatory 21 cytokines can then get to the air, the 22 site of this -- this target organ. 23 So you do not have to have, 24 in particle toxicology and in talc</p>	<p>1 target site, let's say in the case 2 of inhalation or in the case of 3 direct application to the perineal 4 area, you will have the process of 5 impacting with those cells and 6 generating cell mediated reactions 7 and immunological reactions and 8 inflammatory responses. 9 And those inflammatory 10 responses and those reactive 11 oxygen species, except for 12 hydrogen peroxide which can't 13 travel a far distance, can get 14 into -- can and do get into the 15 blood circulation and then can 16 reach distant organs. 17 BY MR. HEGARTY: 18 Q. Cite for me any published 19 authority that says that inflammation in 20 the lungs will cause inflammation in the 21 ovaries. 22 MS. O'DELL: Object to the 23 form. Misstates her testimony. 24 THE WITNESS: To that</p>
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<p>1 toxicology, you do not have to have the 2 presence. Although, in early studies 3 they have found talc particles not only 4 in the ovary, but also in the lymph 5 node -- in the lymphatics that drain the 6 ovary. 7 Q. Cite for me any study that 8 has reported inflammation in the ovaries 9 from inflammation of -- due to a particle 10 in the lung -- strike that. 11 Is it your contention that 12 inflammation in the lung due to a 13 particle will cause inflammation in the 14 ovaries? 15 MS. O'DELL: Objection to 16 form. 17 THE WITNESS: I'm telling 18 you that -- 19 MS. O'DELL: Go ahead. 20 THE WITNESS: -- there's 21 biological plausibility to suggest 22 that. 23 When you have a particle 24 coming in and going to a local</p>	<p>1 specific question, no. But I 2 can -- I can cite you many studies 3 that show in terms of other 4 particles for the lungs that has 5 been shown to cause inflammation 6 in other areas. 7 For example, in the case of 8 Ghio and other investigators, you 9 will find inflammation not only in 10 the blood by the measurement of 11 cytokines in the blood, even 12 though the first target organ was 13 the -- was the lungs. 14 Also, if you look at 15 obesity, obesity is a pro-oxidant 16 state, and that can generate -- 17 the reason obesity causes other 18 health effects is because it's a 19 big mass of inflammation. And the 20 inflammation in that particular 21 site of all those fatty cells, 22 they can release inflammatory 23 mediators that go all over. And 24 that literature is out there.</p>

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<p>1 BY MR. HEGARTY: 2 Q. So is it your opinion for 3 purposes of your biological 4 plausibility -- strike that. 5 Is it -- is your biological 6 plausibility opinion that talc inhaled 7 and in the lungs causes inflammation in 8 the ovaries that can lead to ovarian 9 cancer? 10 A. There's plausibility for 11 that, yes. 12 Q. And can you cite for me any 13 published authority that says that talc 14 inhaled in the lungs will cause 15 inflammation in the ovaries that can lead 16 to ovarian cancer? 17 A. There's multiple parts of 18 that question. 19 Q. That's a very specific 20 question to that very specific subject 21 area. Can you cite to me any published 22 literature that says that? 23 MS. O'DELL: Would you mind 24 repeating the full question or</p>	<p>1 cadmium. 2 Q. So in other words a lot of 3 particles besides talc, according to you, 4 can cause inflammation of the lungs, 5 correct? 6 A. Many do. There are others 7 that do not, like titanium dioxide which 8 were used in many studies as a control. 9 Q. And those nanoparticles, 10 those air particles -- 11 A. In fact -- 12 Q. -- those diesel particles. 13 A. I'm sorry. 14 Q. Okay. And those 15 nanoparticles, those diesel particles, 16 air particles that can cause inflammation 17 in the lungs, will also cause 18 inflammation in the ovaries, correct? 19 MS. O'DELL: Objection to 20 form. 21 THE WITNESS: I said they 22 will cause inflammation 23 systemically. I did not indicate 24 the ovaries.</p>
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<p>1 read it. 2 THE WITNESS: Any published 3 authority that says that -- that 4 says that talc inhaled in the 5 lungs will cause inflammation in 6 the ovaries that can lead to 7 ovarian cancer. 8 For that particular, and 9 that specific of a question, I 10 cannot cite you. 11 BY MR. HEGARTY: 12 Q. You have published 13 extensively on particulates in the air 14 causing inflammation in the lungs, 15 correct? 16 A. In the lungs and 17 systemically. 18 Q. And those particulates 19 include? 20 A. Air particulates; 21 particulate matter, called PM, ambient 22 PM; diesel exhaust particles. I'm also 23 going to go to my CV. Nanoparticles, 24 metal nanoparticles, specifically</p>	<p>1 BY MR. HEGARTY: 2 Q. Well, there's no -- there's 3 nothing unique about talc particles 4 versus the other particles you mentioned, 5 correct? 6 MS. O'DELL: Object to form. 7 THE WITNESS: Size, chemical 8 composition, they -- they -- 9 particles -- particles are -- they 10 can -- they can be different and 11 they can be the same. So many 12 studies use model particles to 13 look at a negative effect like in 14 the Shukla study where they used 15 titanium dioxide particles of a 16 similar size in their -- as a 17 control and got no gene expression 18 changes. 19 Particles in the air, if 20 you're looking at -- there are 21 many factors that go into how a 22 particle behaves, including size, 23 including composition, including 24 morphology.</p>

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<p>1 BY MR. HEGARTY: 2 Q. Well, by your methodology, 3 any particle inhaled that causes 4 inflammation in the lungs is biologically 5 plausible, can lead to ovarian cancer, 6 correct? 7 MS. O'DELL: Object to form. 8 THE WITNESS: No, it can -- 9 sorry. It can lead to 10 inflammation systemically. 11 BY MR. HEGARTY: 12 Q. That can lead to ovarian 13 cancer, correct? 14 A. Inflammation -- 15 MS. O'DELL: Object to the 16 form. 17 Go ahead. 18 THE WITNESS: Sorry. 19 MS. O'DELL: Sorry. 20 THE WITNESS: Inflammation 21 is responsible for -- in my 22 opinion, is the underlying 23 mechanism, a key underlying 24 mechanism for the association for</p>	<p>1 same inflammation that you believe that 2 talc does, correct? 3 A. Inflammation is 4 characterized by certain key components. 5 Inflammation -- whether it's an 6 inflammation in the ovary or an 7 inflammation in the lung or inflammation 8 in the kidney, inflammation is an immune 9 response. And it's going to involve key 10 cells, including the macrophage, the 11 neutrophil, the natural killer cell, all 12 of which can produce reactive oxygen 13 species -- well, primarily the 14 macrophages and neutrophils produce 15 oxygen radicals. 16 However, the natural killer 17 cell, they all produce cytokines, which 18 can produce inflammation. So 19 inflammation is characterized by the same 20 components. 21 Q. And you can't cite for me 22 any different components of the 23 inflammation caused by cadmium as you 24 believe the inflammation that is caused</p>
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<p>1 ovarian cancer, yes. 2 BY MR. HEGARTY: 3 Q. And that mechanism can be 4 initiated by any particle inhaled into 5 the lungs, correct? 6 A. No, it's -- 7 MS. O'DELL: Objection to 8 form. 9 THE WITNESS: Sorry. 10 Well, as -- again, as I 11 stated, it depends on the -- it 12 depends on the particle. For 13 example, titanium dioxide will not 14 produce inflammation in the lungs. 15 However, other particles, many 16 other particles, including 17 cadmium, cadmium oxide particles 18 do cause inflammation, as well as 19 asbestos does, as well as talc has 20 been shown to. 21 They can all produce 22 inflammation or oxidative stress. 23 BY MR. HEGARTY: 24 Q. Cadmium particles induce the</p>	<p>1 by talc, correct? 2 A. When I measured inflammatory 3 responses to the inhalation of cadmium 4 nanoparticles, I looked for the standard 5 inflammatory markers. So I measured in 6 the lung and in the circulation. I 7 measured the percentages of neutrophils, 8 which is a key indicator, key criteria 9 for inflammation. I determined 10 macrophage numbers as well as function in 11 terms of their ability to phagocytose, in 12 their ability to produce reactive oxygen 13 species. And I looked for lung injury, 14 as measured by lactose, lactate 15 dehydrogenase. 16 So when one looks for 17 inflammation in the body, whether it's an 18 animal or a human, C-reactive protein, 19 you are going to be looking for all the 20 same markers. 21 Q. You identified, based on 22 your opinion, no difference in the 23 inflammation caused by talc and the 24 inflammation caused by cadmium, correct?</p>

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<p>1 A. I did not do talc inhalation 2 in my laboratory. The studies 3 indicate -- looked for the same thing. 4 They look for changes in gene expression 5 of activating transcription factors. 6 They did in the Shukla study. 7 They look for the percentage 8 of neutrophils. They look for macrophage 9 activation. We all look at the same 10 thing when coming to the conclusion of 11 inflammation. 12 Q. And according to you, talc 13 and cadmium act similarly with regard to 14 inducing inflammation in the lungs? 15 MS. O'DELL: Objection to 16 form. 17 THE WITNESS: Do they act 18 similarly? Well, I think I 19 answered that question. 20 Inflammation is -- is the -- 21 inflammation is modified by the 22 same components, the same soluble 23 factors, the same cell type 24 factors, including macrophages and</p>	<p>1 because I haven't investigated 2 that literature. 3 But inflammation -- 4 inflammation doesn't change. It 5 can get out of the particular 6 local organ. I don't think that 7 cadmium has been investigated in 8 terms of the ovary. It's 9 certainly been investigated in 10 terms of the kidney, which is 11 local -- which is systemically a 12 distant organ from the local 13 target, which is the lung. And it 14 can cause inflammation in the 15 kidney. 16 BY MR. HEGARTY: 17 Q. You haven't identified any 18 differences between the inflammation 19 caused by other particulates and the 20 inflammation caused by talc, correct? 21 MS. O'DELL: Objection to 22 form. 23 THE WITNESS: Inflammation 24 is inflammation.</p>
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<p>1 neutrophils, dendritic cells, 2 whatever. So inflammation, 3 whether it's acute or chronic 4 inflammation used the same 5 parameters. 6 We call inflammation -- we 7 call inflammation when you -- in a 8 tissue or in organs when you see 9 these characteristics. And we say 10 these are markers indicative. 11 These are pathologies 12 indicative -- these are -- of an 13 inflammatory response. 14 BY MR. HEGARTY: 15 Q. So according to your 16 opinion, that's biologic plausibility 17 between cadmium exposure and ovarian 18 cancer? 19 MS. O'DELL: Objection to 20 form. 21 THE WITNESS: I would have 22 to do more research on that to be 23 able to say that. I would not say 24 biological plausibility, only</p>	<p>1 BY MR. HEGARTY: 2 Q. You referred to fragrances. 3 A. I'm sorry. Could you give 4 me a page? 5 Q. Over on Page 12. You cite 6 to a single study that discusses what 7 exposure levels of these fragrances have 8 been shown to induce a biologically 9 plausible effect in the ovary. 10 MS. O'DELL: Object to the 11 form. 12 THE WITNESS: Many of these 13 fragrances, many of these 14 chemicals within a specific 15 fragrance, it can consist of maybe 16 150 or even more chemicals within 17 any one given fragrance. Many of 18 them have been shown to cause 19 inflammation. 20 BY MR. HEGARTY: 21 Q. Have any of the chemicals in 22 the fragrances that you looked at been 23 reported in the medical literature to 24 induce inflammation in the ovaries?</p>

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<p>1 A. No one specifically -- to my 2 knowledge, no one specifically looked at 3 inflammation in the ovaries. But again, 4 if you go back to the idea of 5 inflammation being caused by a particle 6 at a local site and then having the 7 potential -- or having the capacity I 8 should say, to -- to have that 9 inflammation go to a distant -- a more 10 distant site. 11 So the fact that no one has 12 looked at it does not delete the fact 13 that certainly inflammation can get to 14 distant sites, including the ovary. 15 Q. Well, what is the dose of 16 nickel or -- and cobalt and chromium 17 individually that must -- that the woman 18 must be exposed to in vivo to induce 19 inflammation in the ovaries? 20 MS. O'DELL: Object to the 21 form. Asked and answered. 22 THE WITNESS: There are -- 23 as I said, there's really -- one 24 particle, one piece can start the</p>	<p>1 metals, but there's also -- if you look 2 at nickel and it's a micronutrient, so 3 you can have very, very, very tiny 4 amounts in the body -- very tiny. And it 5 can be used as a micronutrient. 6 You can have lead, but that 7 should not be in the body at all. And 8 there is no safe level of lead. So 9 despite what the regulatory agencies say, 10 there is no safe level which is what 11 their conclusion is moving towards. 12 And -- so a metal is not a 13 metal is not a metal. 14 Now, when you look at these 15 three metals, so for example you have 16 nickel which is classified as a 1A 17 carcinogen, but -- 18 Q. I'll withdraw the question. 19 You're not -- Doctor, you're not 20 answering my question. 21 MS. O'DELL: She is 22 answering your question. 23 MR. HEGARTY: No, she is 24 not.</p>
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<p>1 process for inflammation. 2 BY MR. HEGARTY: 3 Q. So it -- 4 A. It could be one. 5 Q. -- it's your opinion that 6 one particle of nickel will induce 7 inflammation in the ovaries? 8 MS. O'DELL: Objection. 9 BY MR. HEGARTY: 10 Q. Is that correct? 11 A. Will? I can't -- I haven't 12 gone through the literature, but could, 13 certainly. 14 Q. And what literature can you 15 cite that would say that one particle of 16 nickel could cause inflammation in the 17 ovary? 18 A. It's my professional 19 judgment being an expert toxicologist in 20 the area of metals. 21 Q. Okay. Same question as to 22 cobalt and chromium. 23 A. Well, metals can't be lumped 24 together like that. Metals are indeed</p>	<p>1 MS. O'DELL: Yes, she is. 2 And if you don't -- let her 3 finish. 4 MR. HEGARTY: Okay. 5 We'll -- we'll call Judge Pisano 6 and he'll see if we're asking the 7 question -- if she's answering the 8 question. 9 MS. O'DELL: Are you 10 threatening the witness by saying 11 that? 12 MR. HEGARTY: No, I'm 13 talking to you. We'll go off the 14 record -- 15 MS. O'DELL: You're 16 threatening the witness and -- no, 17 we're not going off the record. 18 MR. HEGARTY: Go off the 19 record, let's go off the record. 20 MS. O'DELL: No, we are not 21 going off the record. 22 MR. HEGARTY: Yes, let's go 23 off the record. 24 MS. O'DELL: If she's</p>

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<p style="text-align: right;">Page 318</p> <p>1 answering your question, she --</p> <p>2 she gets the right to finish her</p> <p>3 answer. You don't cut her off,</p> <p>4 Mark.</p> <p>5 MR. HEGARTY: Let's go off</p> <p>6 the record.</p> <p>7 MS. O'DELL: No, we're not</p> <p>8 going off the record. She's</p> <p>9 finishing her answer.</p> <p>10 MR. HEGARTY: Let's go off</p> <p>11 the record. I'm not --</p> <p>12 MS. O'DELL: And then you</p> <p>13 can ask her another question.</p> <p>14 MR. HEGARTY: Let's go off</p> <p>15 the record. It's my deposition.</p> <p>16 MS. O'DELL: No. It's your</p> <p>17 deposition, but it's not fair to</p> <p>18 mistreat this witness if she is</p> <p>19 answering your question.</p> <p>20 MR. HEGARTY: I'm not</p> <p>21 mistreating the witness.</p> <p>22 MS. O'DELL: Yes, you are.</p> <p>23 MR. HEGARTY: We'll go off</p> <p>24 the record and call Judge Pisano.</p>	<p style="text-align: right;">Page 320</p> <p>1 either inhaled or applied to the perineum</p> <p>2 will induce inflammation in the ovaries?</p> <p>3 A. It's my opinion that it</p> <p>4 could.</p> <p>5 Q. What literature do you have</p> <p>6 to support that opinion?</p> <p>7 A. My professional opinion as a</p> <p>8 toxicologist in metals with over</p> <p>9 30 years.</p> <p>10 Q. Next question. Is it your</p> <p>11 opinion that one particle of cobalt,</p> <p>12 either inhaled or applied to the</p> <p>13 perineum, will induce inflammation in the</p> <p>14 ovaries?</p> <p>15 A. Again, it's my opinion that</p> <p>16 it -- it could. It has the biological</p> <p>17 plausibility to, because inflammation,</p> <p>18 although not as toxic in many ways as</p> <p>19 it's classified as a 2B -- 2B by IARC</p> <p>20 is -- has the potential -- does cause</p> <p>21 inflammation, and that inflammation can</p> <p>22 leave the site of the target site.</p> <p>23 Q. What authority do you have</p> <p>24 for that opinion?</p>
<p style="text-align: right;">Page 319</p> <p>1 MS. O'DELL: You are</p> <p>2 mistreating the witness by not</p> <p>3 allowing her to finish her --</p> <p>4 MR. HEGARTY: I withdrew the</p> <p>5 question.</p> <p>6 MS. O'DELL: Well, okay.</p> <p>7 The with -- the question was</p> <p>8 withdrawn. Ask a question, let</p> <p>9 her --</p> <p>10 MR. HEGARTY: No, we're off</p> <p>11 the record. We're going to call</p> <p>12 Judge Pisano.</p> <p>13 MS. O'DELL: Okay. Great.</p> <p>14 THE VIDEOGRAPHER: Off the</p> <p>15 record. The time is 3:21 p.m.</p> <p>16 Off the record.</p> <p>17 (Whereupon, a discussion was</p> <p>18 held off the record.)</p> <p>19 THE VIDEOGRAPHER: We are</p> <p>20 back on the record. The time is</p> <p>21 3:23 p.m.</p> <p>22 BY MR. HEGARTY:</p> <p>23 Q. Dr. Zelikoff, is it your</p> <p>24 opinion that one particle of nickel</p>	<p style="text-align: right;">Page 321</p> <p>1 A. My professional opinion.</p> <p>2 Q. Is it your opinion that one</p> <p>3 particle of chromium, either inhaled or</p> <p>4 applied to the perineum, will induce</p> <p>5 inflammation in the ovaries?</p> <p>6 MS. O'DELL: Objection to</p> <p>7 the form.</p> <p>8 THE WITNESS: It depends on</p> <p>9 the form of the chromium.</p> <p>10 BY MR. HEGARTY:</p> <p>11 Q. What form of chromium does</p> <p>12 it need to be?</p> <p>13 A. A trivalent chromium</p> <p>14 which -- I'm sorry, hexavalent chromium</p> <p>15 which will then get into the cell, start</p> <p>16 the process and -- and convert to</p> <p>17 chromium-3, 4 and 5.</p> <p>18 Q. That's chromium-6, correct?</p> <p>19 A. Hexavalent chromium is</p> <p>20 chromium-6, right.</p> <p>21 Q. Is it your opinion that one</p> <p>22 particle of chromium-6, either inhaled or</p> <p>23 applied to the perineum, will induce</p> <p>24 inflammation in the ovaries?</p>

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<p>1 MS. O'DELL: Objection to 2 form. 3 THE WITNESS: It could, 4 because inflammation again could 5 leave the target site. And it 6 depends on the form of the metal. 7 So we have soluble metals -- 8 I don't want to go on too long. 9 You have soluble metals and 10 insoluble metals. Some of them 11 are more toxic and more -- and 12 potentially more carcinogenic than 13 other forms. There are many salts 14 within those metals that you gave. 15 BY MR. HEGARTY: 16 Q. And what authority do you 17 have for the statement that one particle 18 of chromium, either inhaled or applied to 19 the perineum, will induce inflammation in 20 the ovaries? 21 A. My professional judgment. 22 Q. Will one particle of the 23 fragrance of the chemicals that you list 24 from the fragrances, either inhaled or</p>	<p>1 lumped. And particles oftentimes, 2 if they're different in size, if 3 they're different in chemical 4 structure, if they have iron or 5 don't have iron, you have -- you 6 may have differences. 7 BY MR. HEGARTY: 8 Q. Will one particle from 9 diesel exhaust, inhaled or applied to the 10 perineum, cause inflammation in the 11 ovary? 12 MS. O'DELL: Object to the 13 form. 14 THE WITNESS: Again, same 15 answer, it could. Depends on the 16 particle size, the particle type, 17 the particle morphology. And it 18 has the potential to induce 19 inflammation as shown in cells. 20 And can produce an oxidant state. 21 BY MR. HEGARTY: 22 Q. Doesn't inflammation just 23 reflect the body's normal response to the 24 presence of the particles?</p>
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<p>1 applied to the perineum, cause 2 inflammation to the ovaries? 3 MS. O'DELL: Objection to 4 the form. 5 THE WITNESS: If -- I -- I 6 don't have the knowledge, I don't 7 have the literature knowledge to 8 answer that question. 9 BY MR. HEGARTY: 10 Q. Will one -- will one 11 particle of -- of cadmium, either inhaled 12 or applied to the perineum, cause 13 inflammation in the ovaries? 14 A. It can cause -- 15 MS. O'DELL: Objection to 16 form. You can answer. 17 THE WITNESS: It can cause 18 inflammation in the area if it's 19 inhaled in the lung and that 20 inflammation can get out 21 systemically. 22 Now it depends, again, on 23 the size of the particle. Metals, 24 as I said before, cannot be</p>	<p>1 A. There are two -- there are 2 two forms of -- well, there are multiple 3 forms of inflammation. But the two that 4 are of concern and in -- in response to 5 your question, is that they are acute 6 inflammation and there is chronic 7 inflammation. 8 And with acute inflammation, 9 the first response to a foreign -- a 10 foreign particle or an antigen on a 11 bacterial cell or an infectious agent, is 12 for the body to mount an immune response. 13 How it does that is through 14 the same cell types that I just 15 mentioned. Polymorphonucleocytes, also 16 known as neutrophil. Macrophages, and 17 those are the two key players, but 18 natural killer cells all come into it. 19 That involves the innate 20 immune system. And so the first thing to 21 protect the body, whether it's a viral 22 infection or whether it's a bacterial 23 infection or whether it's a foreign 24 particle, is to mount that kind of immune</p>

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<p style="text-align: right;">Page 326</p> <p>1 response to kill or negatively impact 2 that particular particle. 3 That will then -- that's an 4 innate immune response being active. 5 That will then, in some cases, upregulate 6 the T-cell and -- and humoral or -- and 7 cell-mediated immune response. 8 Now, that is, in terms of 9 cancers and in terms of tumors, that is 10 called immunosurveillance and that's the 11 first thing. And you're absolutely 12 right. The purpose of the immune system 13 is to protect the body. That is the 14 function. 15 However, there are three 16 stages or three types of processes for 17 the immune system in carcinogenesis. The 18 second being immuno equilibrium. But the 19 part that is the last part is that the 20 tumor can actually quiet or cause 21 immunosenescence of the immune system. 22 So in a chronic 23 inflammation, it does not always act in 24 the best interest of the -- of the host</p>	<p style="text-align: right;">Page 328</p> <p>1 inflammation. Not that they involve 2 different cell types or different 3 mechanisms. But they are called, in 4 terms of timing or temporality, acute 5 which will kill whatever right away and 6 then chronic which unfortunately keeps 7 playing back on itself and the 8 inflammation will continue. 9 Q. Granulomas which you just 10 mentioned don't cause cancer, correct? 11 A. Granulomas do not -- I'm 12 sorry. 13 Q. Granulomas which you just 14 mentioned don't cause cancer, correct? 15 A. Granulomas are in response 16 to a foreign body. In the case of 17 asbestos or in the case of another type 18 of fiber, macrophage will come over and 19 their normal process in what we call 20 innate immunity is to engulf the fiber. 21 And unfortunately, many times the fiber 22 cannot be engulfable or the particle 23 cannot be engulfable. 24 And so many macrophage will</p>
<p style="text-align: right;">Page 327</p> <p>1 but in the best interest of the tumor. 2 So your -- the answer to 3 your question is yes, that's the function 4 of it. But it can behave, it's a 5 two-prong sword. 6 Q. You said there are multiple 7 types of inflammation and you listed two 8 types: Acute and chronic. Are there any 9 other types besides those two? 10 A. Well, you have the reactions 11 to those inflammation in terms of having 12 a foreign body reaction. That is part of 13 an inflammatory response. So in terms of 14 temporality or timing, inflammation is 15 acute and is chronic. 16 What occurs during that 17 time, such as a foreign body reaction 18 where macrophages all come together and 19 engulf the particle or the fiber and try 20 to keep it within a localized space, that 21 is a process that can occur within 22 inflammation. 23 So my answer to you is that 24 there are two major types of</p>	<p style="text-align: right;">Page 329</p> <p>1 come over, and they will try to engulf it 2 as a body. And that is called a 3 granulomatous reaction. 4 And that's what happens 5 during tuberculosis when the organism 6 forms, many macrophages come over to kill 7 the organism, but it can't, and so they 8 form granulomas. 9 Q. Doctor, listen to my 10 question. I didn't ask you what a 11 granuloma was. I asked you, granulomas 12 don't cause cancer, correct? 13 MS. O'DELL: Object to form. 14 THE WITNESS: There is no 15 literature to my knowledge that 16 shows a granuloma, meaning immune 17 response, forming macrophages 18 engulfing, can cause cancer. 19 BY MR. HEGARTY: 20 Q. And a reaction to 21 inflammation can include the development 22 of fibrosis or scar tissue, correct? 23 A. That is a long-term chronic 24 response associated with chronic</p>

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<p style="text-align: right;">Page 330</p> <p>1 inflammation. 2 Q. And there's no literature 3 linking fibrosis to cancer, correct? 4 MS. O'DELL: Object to the 5 form. 6 THE WITNESS: My 7 professional opinion is that there 8 is literature -- let me just read 9 over the question, please. 10 So fibrosis is produced by 11 release of factors from the 12 macrophage. And it causes 13 scarring within that particular 14 target organ. 15 Now, whether or not that -- 16 those -- that scarring can 17 actually make that site more 18 vulnerable to cancer, like in the 19 case of hepatitis, where you get 20 scarring, and you get cancer as a 21 result of that particular 22 fibrosis, but they are two 23 different diseases. 24 But whether the area of</p>	<p style="text-align: right;">Page 332</p> <p>1 A. Fibrosis does not morph or 2 turn into cancer. That is correct. 3 Q. In Section 12 -- I'm sorry. 4 On Page 12, under your section 5 "exposure," talc particle access to the 6 body. 7 Do you see that section? 8 A. Is this Paragraph 1, 2, or 9 3? 10 Q. Well, I'm looking just at 11 the Section Number 4 right now. 12 A. Yes. Okay. Section Number 13 6 is on Page 12. 14 Q. Section 6. I'm sorry. I 15 had those transposed. 16 A. And please repeat your 17 question. 18 Q. You never -- prior to being 19 contacted by counsel for plaintiffs, you 20 never looked at the studies reporting on 21 whether talc can reach the ovaries via 22 inhalation or perineal application, 23 correct? 24 A. I did not study the</p>
<p style="text-align: right;">Page 331</p> <p>1 fibrosis creates a more vulnerable 2 tissue base that can -- that can 3 progress or go to cancer is a 4 question that there is some 5 examples of, but -- in the liver 6 in particular. 7 BY MR. HEGARTY: 8 Q. Well, there's no literature 9 reporting an increased risk of cancer in 10 any organ because there's fibrosis in 11 that organ, correct? 12 A. What I'm saying is that in 13 terms of the liver and in terms of 14 fibrosis, let's say from ethanol or 15 acetaminophen ingestion, you get fibrosis 16 which is a whole disease or symptomology 17 by itself, and then you have cancer, 18 which is another disease. But what I'm 19 saying is that in the area where the 20 injury and the fibrosis occurs, in the 21 liver there is a higher risk of getting 22 cancer. 23 Q. Fibrosis doesn't morph or 24 turn into cancer?</p>	<p style="text-align: right;">Page 333</p> <p>1 literature or review the literature prior 2 to being contacted. But I studied it and 3 reviewed it extensively after being 4 contacted. 5 Q. On Page 12 of the last 6 paragraph -- I'm sorry -- second-to-last 7 paragraph, which begins, "A common 8 exposure route." 9 Do you see that paragraph? 10 A. I do. Thank you. 11 Q. You write, "Again, a common 12 exposure route for cosmetic talc is via 13 the dermal route including vaginally 14 after perineal application." 15 A. Yes. 16 Q. Is it your testimony that 17 there's biologic plausibility with talc 18 applied to the skin? 19 A. Applied to the skin, talc 20 does not -- is not absorbed into the skin 21 or through the skin, although there is 22 some question as to whether if there's 23 injury or scratch or openings in the 24 skin, whether the talc can penetrate.</p>

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<p>1 But in and of itself talc cannot 2 penetrate through the skin. 3 However, we're not -- when 4 we're talking about perineal or vaginal 5 application, you are not talking about an 6 epidermal subcutaneous keratinized skin. 7 Q. None of the studies that you 8 cite in this paragraph researched 9 particle transport through the 10 reproductive tract through perineal 11 application, correct? 12 MS. O'DELL: Object to the 13 form. 14 THE WITNESS: These -- it is 15 extremely technically difficult, 16 from my knowledge as an animal 17 toxicologist, to do perineal 18 application to a mouse. 19 BY MR. HEGARTY: 20 Q. I'm going to withdraw the 21 question. Doctor, you will not respond 22 to my question. My question is simply, 23 none of the studies that you cite in this 24 paragraph researched particle transport</p>	<p>1 the form. 2 BY MR. HEGARTY: 3 Q. Correct? 4 MS. O'DELL: Excuse me. You 5 may answer his question any way 6 you'd want to, Doctor. 7 THE WITNESS: None of these 8 that I have stated on Page 12 9 refer to perineal exposure in the 10 second paragraph in terms of 11 Venter, Iturralde, Sjosten and 12 Heller. 13 However, on Page -- on Page 14 13, there is a study by Keskin, 15 who used rats and did a vaginal or 16 perineum to talc. 17 BY MR. HEGARTY: 18 Q. I'm going to move to strike. 19 We're going to go off the record. 20 MR. HEGARTY: We're going to 21 call Judge Pisano. There's no 22 reason to add that additional part 23 to the answer to that question. 24 And I'm not -- I'm tired of that</p>
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<p>1 through the reproductive tract through 2 perineal application. That's correct? 3 A. There is a study, and I'm 4 afraid the name of the author does not 5 come to me. So allow me to look at my 6 report. 7 Q. And I'm just talking about 8 the authorities that you cite in the 9 second paragraph beginning, "A common 10 exposure route." 11 MS. O'DELL: Feel free to 12 look at your report if you need 13 to, Doctor. 14 THE WITNESS: I understand. 15 On Page 13, animal models -- 16 BY MR. HEGARTY: 17 Q. Doctor, that's not my 18 question. My question is in the 19 paragraph that I referenced beginning a 20 common exposure route, none of those 21 authorities looked at transport of the 22 particles via application of those 23 particles to the perineum? 24 MS. O'DELL: Objection to</p>	<p>1 happening. So we'll call him 2 unless you're going to talk to the 3 witness. 4 MS. O'DELL: Is your 5 objection she didn't answer your 6 question? Because she -- you 7 asked her about the paragraph. 8 She said "no; however" -- 9 MR. HEGARTY: We're off the 10 record. 11 MS. O'DELL: No, we're not 12 off the record. 13 MR. HEGARTY: We're off the 14 record. 15 MS. O'DELL: No, we -- 16 MR. HEGARTY: We're going 17 off the record. 18 MR. LOCKE: We are off. Let 19 me throw out something. We've got 20 seven hours. I think there's a 21 plan here to stall, and we need to 22 do a better job of keeping things 23 moving, or we are going to have to 24 ask the court for more time.</p>

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<p>1 MR. HEGARTY: Let's go off 2 the record. 3 MS. O'DELL: The suggestion 4 that there's -- let me just -- 5 before we go off the record, the 6 suggestion that there's somehow a 7 plan to -- is incorrect, and 8 improper. So if you want to go 9 off the record, I think you've got 10 an answer to your question, which 11 was, "No, not in the paragraph." 12 However, she has a right to 13 point to evidence in her report. 14 That's perfectly appropriate. 15 MR. HEGARTY: We'll let 16 Judge Pisano decide. We'll go off 17 the record. 18 THE VIDEOGRAPHER: The time 19 is 3:39 p.m. Going off the 20 record. 21 (Short break.) 22 THE VIDEOGRAPHER: The time 23 is 4:04 p.m. Back on the record. 24 MR. HEGARTY: We're back on</p>	<p>1 have looked at transport of dry powder 2 talc to the perineum showing that the -- 3 that talc transports to the ovaries, 4 correct? 5 MS. O'DELL: Object to the 6 form. 7 THE WITNESS: When we say -- 8 when you say talc, you're 9 referring to talcum powder 10 products? 11 BY MR. HEGARTY: 12 Q. Correct, correct. 13 A. That's correct to my 14 knowledge. 15 Q. And are you aware that talc 16 is in toilet paper? 17 A. Yes, I just learned that 18 recently. 19 Q. Can talc in toilet paper 20 migrate to the ovaries? 21 MS. O'DELL: Object to the 22 form. 23 THE WITNESS: Can -- my 24 knowledge is that talc in toilet</p>
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<p>1 the record and we're going to 2 continue without calling Judge 3 Pisano at this time. But we do 4 reserve the right to ask Judge 5 Pisano for more time based on our 6 belief that Dr. Zelikoff has many 7 occasions over the course of this 8 deposition not been responsive to 9 the questions asked and as a 10 result has -- has wasted the 11 defendant's time and to our 12 prejudice. 13 So -- but we're going to go 14 forward and see if we can finish 15 this deposition. 16 MS. O'DELL: Plaintiffs will 17 obviously oppose that -- that 18 motion. Dr. Zelikoff has been 19 responsive to your questions. 20 BY MR. HEGARTY: 21 Q. Dr. Zelikoff, we're talking 22 about the section on talc particle's 23 access to the body. There have been no 24 studies in either animals or humans that</p>	<p>1 paper is -- is bound to the 2 other -- the other components 3 there. So unless it becomes 4 bioavailable it cannot migrate 5 from the toilet paper. 6 BY MR. HEGARTY: 7 Q. How about talc -- talc in 8 soap, is there talc in soaps? 9 A. To my knowledge there is. 10 Q. Can talc in soaps, if 11 applied to the perineum, migrate to the 12 ovaries? 13 A. If it becomes -- 14 MS. O'DELL: Object to form. 15 THE WITNESS: If it becomes 16 bioavailable. Likely bound up to 17 the other components. 18 BY MR. HEGARTY: 19 Q. When you say bioavailable, 20 what do you mean? 21 A. To me, "bioavailable" means 22 that the body can see it, and it 23 becomes -- it becomes -- it has access to 24 biological responsiveness.</p>

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<p>1 Q. And do you know a 2 Dr. Benjamin Neel at NY University -- New 3 York University? 4 A. Dr. Neel, isn't he the head 5 of the cancer center? 6 Q. He is. 7 A. He is the head of the cancer 8 center. 9 Q. Do you know him? 10 A. I do not know him. 11 Q. Does he know more about 12 cancer biology than you do? 13 MS. O'DELL: Object to the 14 form. 15 THE WITNESS: I've not seen 16 his CV. I would assume as head of 17 the cancer center, that he 18 probably does. Since that is not 19 my area of study. 20 BY MR. HEGARTY: 21 Q. Are dose-response 22 relationships important in evaluating 23 potential carcinogenicity of a substance? 24 A. Dose-response --</p>	<p>1 Q. You need a specific page? 2 Over on Page 16. Over the course of this 3 page and carrying over to the next page, 4 you cite a number of studies that refer 5 to talc causing pleural inflammation, 6 correct? 7 A. Yes. 8 Q. Talc causing granulomas, 9 correct? 10 A. Yes. 11 Q. Talc causing pulmonary 12 interstitial fibrosis, correct? 13 A. Talcum powder can do those 14 things, yes. 15 Q. And talc causing 16 carcinogenic activity in the lungs, 17 correct? 18 A. Are you referring to a 19 specific line? 20 Q. No, I'm not referring to a 21 specific line. I'm talking about 22 generally from this part of your report. 23 A. In general, this is the 24 section on inhalation. I'm talking</p>
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<p>1 dose-responses are -- contribute to, as I 2 said frequency, duration, exposure route. 3 They all contribute to carcinogenicity. 4 Q. In other words, in 5 evaluating the carcinogenicity of a 6 substance, it's important to look at dose 7 relationships, correct? 8 A. Are you speaking about 9 dose-response, or more than one dose? 10 Q. Let me ask it again. In 11 evaluating the substance for 12 carcinogenicity purposes, it's important 13 to look at dose-response relationships, 14 correct? 15 A. It's important to look at 16 dose-response relationships, but it's not 17 the only factor, is what I'm saying. 18 Q. In your report, you cite a 19 number of reactions to talc that have 20 been reported, pleural inflammation, 21 granulomas, pulmonary 22 interstitial fibrosis -- 23 A. What page are you referring 24 to?</p>	<p>1 about -- yes, I'm talking about talcum 2 powder and its ability to bring about 3 changes in the lungs that could lead to 4 carcinogenic -- carcinogenesis. 5 Q. Of the reactions that we 6 just talked about, have any of those been 7 reported in women using talc on the 8 perineum? 9 A. There have been no studies 10 to my knowledge showing that application 11 of perineal talc can produce -- produces 12 lesions in the lungs. 13 Q. And there's been no studies 14 that you are -- of which you are aware 15 that have reported findings of granulomas 16 in women using talc in the perineum, 17 correct? 18 A. There is evidence of 19 inflammation clearly, but there -- to my 20 knowledge, I have not seen any of the 21 literature which shows a granuloma in the 22 ovary. 23 Q. What studies have you seen 24 that have reported seeing inflammation in</p>

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<p>1 the ovaries of women using talc on the 2 perineum? 3 MS. O'DELL: Object to the 4 form. 5 THE WITNESS: I'm just 6 trying to find the section. 7 There were many studies, I 8 can't right now, without finding 9 it in my report, identify any one 10 in particular. 11 BY MR. HEGARTY: 12 Q. Well, sitting here today, 13 can you cite any study that has reported 14 on finding inflammation of the ovaries 15 following perineal application of talc? 16 A. As I said, there are many -- 17 there are many examples in animal models 18 that was not perineal, that was vaginal, 19 as you stated. 20 There were studies -- 21 study -- an early study which identified 22 talcum powder particles in the ovary with 23 inflammatory responsiveness or 24 inflammatory responses. That was a</p>	<p>1 disease. 2 Q. Okay. Rheumatoid arthritis 3 does not increase the risk of cancer, 4 correct? 5 A. Rheumatoid arthritis, for 6 what's known now, does not increase the 7 risk of cancer. 8 Q. Psoriasis is another chronic 9 inflammatory process, correct? 10 A. Another autoimmune disease 11 and another inflammatory process, yes. 12 Q. Having psoriasis does not 13 increase the risk of any form of cancer, 14 correct? 15 A. Not that -- not that we know 16 with the current knowledge. 17 Q. So just having chronic 18 inflammation does not mean cancer will 19 develop, correct? 20 MS. O'DELL: Object to the 21 form. 22 THE WITNESS: Just having 23 chronic inflammation does not have 24 to indicate. It's one -- again,</p>
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<p>1 very -- that was a very early study. I'm 2 not sure if it was Hamilton or Henderson. 3 If I may. 4 I'm sorry it's not coming to 5 mind now. 6 Q. Okay. Over on Page 20 you 7 discuss the role of the immune system -- 8 A. Yes, sir. 9 Q. -- correct? 10 A. I see that, yes. 11 Q. You agree that it's not 12 generally accepted by the medical or 13 scientific communities that all cancers 14 are caused by chronic inflammation, 15 correct? 16 A. There are other mechanisms 17 that are associated with carcinogenesis 18 and the process of carcinogenesis. If 19 you'd like, I can identify those. 20 Q. You agree that there are 21 types of chronic inflammation that are 22 not related to cancer. Rheumatoid 23 arthritis is one, correct? 24 A. That's an autoimmune</p>	<p>1 it's one mechanism that provides 2 biological plausibility for the 3 cancer induction. 4 If I may give an example. 5 BY MR. HEGARTY: 6 Q. Well, let me -- that's not 7 what I asked you for. 8 A. Okay. I thought I answered 9 your question. 10 Q. Does having pelvic 11 inflammatory disease cause ovarian 12 cancer? 13 A. The inflammation has been 14 linked with ovarian cancer, yes. 15 Q. In your opinion is there a 16 biologically plausible mechanism between 17 PID and ovarian cancer? 18 A. Well, PID is usually 19 associated with an infection. And what's 20 related to cancer and why there's higher 21 risk in inflammatory diseases of 22 endometriosis and pelvic inflammatory 23 disease is through a mechanism of 24 inflammation.</p>

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<p>1 Q. Your biologically plausible 2 mechanism for talc and ovarian cancer is 3 inflammation, correct? 4 A. That's primary, yes. 5 Q. You make reference to MUC-1. 6 That's not your biological plausibility 7 mechanism, is it? 8 A. You mean MUC-1 -- 9 Q. Yes. 10 A. -- antibodies? 11 Q. Correct? 12 A. MUC-1, if I may explain it, 13 is mucin. And -- 14 Q. I don't want to interrupt. 15 I'm not after an explanation. I just 16 wanted to know whether it's part -- 17 whether the references you include in 18 your report to MUC-1 are included in your 19 biologically plausible opinion? 20 A. It is included in my -- in 21 reaching my opinion, yes. 22 Q. Is that a separate mechanism 23 from inflammation? 24 A. It is a separate mechanism</p>	<p>1 A. It's -- the only evidence 2 out there that addresses this is when 3 they do correlation studies with the 4 level of antibodies to MUC-1. And when 5 the antibody levels are decreased, then 6 you have -- they found that you have an 7 increased risk of ovarian cancer. 8 Q. There are no studies 9 reporting or correlating MUC-1 levels in 10 talcum powder users to ovarian cancer 11 risk, correct? 12 MS. O'DELL: Object to form. 13 THE WITNESS: Not to my 14 knowledge. 15 MS. O'DELL: Sorry. 16 BY MR. HEGARTY: 17 Q. And measuring MUC-1 is not 18 used to diagnose ovarian cancer, correct? 19 A. MUC-1 is also known as 20 CA-125, and it is used as a marker. 21 Q. My question is, is MUC-1 22 used to -- levels -- strike that. 23 Are MUC-1 levels used to 24 diagnose a woman with ovarian cancer?</p>
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<p>1 from inflammation. It's seen in ovarian 2 cancer as a marker. And when you have -- 3 evidence has shown that if you have 4 antibodies to MUC-1, and if they're 5 decreased as is seen in response to talc, 6 that you will have less of an immune 7 response and protection. 8 Q. Can you cite for me any 9 study that has correlated MUC-1 levels 10 with ovarian cancer risk? 11 MS. O'DELL: Object to form. 12 THE WITNESS: They use it as 13 a marker. The literature uses 14 MUC-1 as a marker of cancer. Can 15 I cite you any studies that links 16 it with ovarian cancer? No, I 17 cannot. 18 BY MR. HEGARTY: 19 Q. Are there any studies that 20 link the levels of MUC-1 to ovarian 21 cancer risk? 22 A. Do you mean human studies or 23 animal? 24 Q. Yes, human studies only.</p>	<p>1 A. My response to that is MUC-1 2 is synonymous with CA-125. CA-125 is a 3 shed marker in the blood associated with 4 ovarian cancer, so yes. 5 Q. Okay. Is it your testimony 6 that for purposes of -- strike that. 7 Is it your testimony that 8 CA-125 levels are used to diagnose 9 ovarian cancer? 10 MS. O'DELL: Object to the 11 form. 12 THE WITNESS: I'm saying 13 that CA-125 is used as a 14 biological marker of progression, 15 extent, and intensity and whether 16 ovarian cancer is present. 17 BY MR. HEGARTY: 18 Q. My question is, in a woman 19 who comes in complaining of symptoms that 20 might be ovarian cancer, is CA-125 used 21 to diagnose ovarian cancer? 22 A. I'm sorry, I'm not a 23 physician. I can't answer that question 24 in terms of what -- what an OB/GYN or an</p>

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<p>1 oncologist would do.</p> <p>2 Q. And measuring CA-125 levels</p> <p>3 does not give you any evidence of the</p> <p>4 etiology of the ovarian cancer, correct?</p> <p>5 A. Not to the etiology.</p> <p>6 However, it is an epithelial-associated</p> <p>7 protein.</p> <p>8 So if we are talking about</p> <p>9 epithelial, and we are talking about</p> <p>10 epithelial ovary carcinoma, it is related</p> <p>11 to -- to that.</p> <p>12 Q. Does all types -- do all</p> <p>13 types of inflammation irreparably damage</p> <p>14 tissue?</p> <p>15 A. Irreparably. Do you mean</p> <p>16 persistently without -- is there</p> <p>17 recovery?</p> <p>18 Q. No, my question is do all</p> <p>19 types of inflammation, all acute, all</p> <p>20 chronic inflammation, damage tissue where</p> <p>21 it's not repaired?</p> <p>22 A. Where it's not repaired?</p> <p>23 Q. Yes.</p> <p>24 A. No, you can have -- with</p>	<p>1 the systematic review of the</p> <p>2 literature as I have. But each</p> <p>3 doctor, I'm sure, makes their own</p> <p>4 opinion.</p> <p>5 BY MR. HEGARTY:</p> <p>6 Q. Can you cite any doctor who</p> <p>7 treats ovarian cancer or researches</p> <p>8 ovarian cancer who believes that the</p> <p>9 biological plausible mechanism of ovarian</p> <p>10 cancer is inflammation?</p> <p>11 A. I have not spoken to any</p> <p>12 doctors in that regard.</p> <p>13 Q. What does the inflammation</p> <p>14 in the ovary look like in your opinion</p> <p>15 from talc exposure?</p> <p>16 A. It looks like any other</p> <p>17 local target of inflammation, in that</p> <p>18 there are neutrophils, immune cells that</p> <p>19 migrate into the area. There are</p> <p>20 macrophages that migrate into the area.</p> <p>21 There can be higher levels of cytokines</p> <p>22 like interleukin and chemotactic factor,</p> <p>23 growth factor.</p> <p>24 Q. Such inflammation, if it was</p>
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<p>1 acute inflammation, of course you can</p> <p>2 have repair of -- it's there to protect</p> <p>3 against the invader.</p> <p>4 Q. Does having inflammation in</p> <p>5 one organ or one tissue in the body</p> <p>6 always mean that other tissues in the</p> <p>7 body will be inflamed?</p> <p>8 A. It does not always mean</p> <p>9 that.</p> <p>10 Q. The medical community has</p> <p>11 not generally accepted that chronic</p> <p>12 inflammation is a cause of ovarian</p> <p>13 cancer, correct?</p> <p>14 MS. O'DELL: Objection to</p> <p>15 form.</p> <p>16 THE WITNESS: Again, I'm not</p> <p>17 quite sure what you mean by</p> <p>18 generally accepted. Everyone</p> <p>19 has -- every medical community has</p> <p>20 its own opinion. I'm sure there</p> <p>21 are many doctors who do embrace</p> <p>22 it. And I'm sure there are many</p> <p>23 doctors who do not. I'm not sure</p> <p>24 whether they've done the extent of</p>	<p>1 occurring would be visible, correct?</p> <p>2 A. Not necessarily. In a -- in</p> <p>3 a chronic -- first of all, you can get</p> <p>4 different time periods. So</p> <p>5 inflammation -- if it's chronic</p> <p>6 inflammation you are talking about one</p> <p>7 thing. And then you might see some</p> <p>8 remnants of the inflammation.</p> <p>9 But if you look at a period</p> <p>10 of time, you can miss the inflammatory</p> <p>11 response. It can be there, impact the</p> <p>12 cells and then be gone.</p> <p>13 Q. Even with chronic</p> <p>14 inflammation?</p> <p>15 A. With chronic inflammation,</p> <p>16 if you looked hard enough you would find</p> <p>17 the remnants of its presence and you will</p> <p>18 also likely find neutrophilic</p> <p>19 infiltration.</p> <p>20 Q. Has that --</p> <p>21 A. That does not last forever.</p> <p>22 Q. Has that ever -- that --</p> <p>23 those findings ever been reported in</p> <p>24 women using talc in the perineum?</p>

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<p style="text-align: right;">Page 358</p> <p>1 A. The inflammatory response?</p> <p>2 Q. Correct.</p> <p>3 A. Or the infiltration? Not</p> <p>4 that I'm aware of. Not in my report.</p> <p>5 Q. How many applications of</p> <p>6 talc to the perineum does it take to</p> <p>7 cause chronic inflammation in the</p> <p>8 ovaries?</p> <p>9 A. That's -- that</p> <p>10 information -- that is not known how many</p> <p>11 applications, whether it could be one or</p> <p>12 it needs to be over a period of three</p> <p>13 years or a period of ten years. Some of</p> <p>14 the meta-analysis evaluations indicated</p> <p>15 that there were some temporal</p> <p>16 associations with it, and that it needed</p> <p>17 to be used longer than ten years, where</p> <p>18 you saw responsiveness. And others</p> <p>19 indicated less than ten years.</p> <p>20 So it's -- it's difficult to</p> <p>21 say, and it's also associated with the</p> <p>22 woman.</p> <p>23 Q. Does acute inflammation</p> <p>24 cause cancer?</p>	<p style="text-align: right;">Page 360</p> <p>1 Q. None of those inflammatory</p> <p>2 markers are tested to diagnose or monitor</p> <p>3 a woman for developing ovarian cancer,</p> <p>4 correct?</p> <p>5 A. To my knowledge, tumor</p> <p>6 necrosis factors, C-reactive protein,</p> <p>7 none of the interleukins are monitored.</p> <p>8 But again, I have to say</p> <p>9 that I'm not an OB/GYN and so I'm not --</p> <p>10 I'm not familiar with what their -- what</p> <p>11 they are using other than what's in the</p> <p>12 literature.</p> <p>13 Q. And no study has clinically</p> <p>14 correlated those markers with ovarian</p> <p>15 cancer or ovarian cancer risk, correct?</p> <p>16 MS. O'DELL: Objection to</p> <p>17 form.</p> <p>18 THE WITNESS: In looking at</p> <p>19 biological plausibility, which</p> <p>20 I'm -- which I'm focused on, the</p> <p>21 indication of those elevated</p> <p>22 levels as well as decreased levels</p> <p>23 of antioxidants are associated</p> <p>24 with inflammation and are</p>
<p style="text-align: right;">Page 359</p> <p>1 A. Acute inflammation has not</p> <p>2 been linked to my knowledge to cancer.</p> <p>3 As I said, it's used as an immune</p> <p>4 surveillance and protective mechanism as</p> <p>5 you pointed out.</p> <p>6 Q. Over on Pages 20 and 21 of</p> <p>7 your report you refer to CRP and other</p> <p>8 inflammatory markers, cytokines,</p> <p>9 inflammatory mediators. Do you see the</p> <p>10 section I'm referring to?</p> <p>11 A. I -- roles of the immune</p> <p>12 system, and then Section E, ovarian</p> <p>13 cancer inflammation?</p> <p>14 Q. Correct.</p> <p>15 A. Which section are you</p> <p>16 referring to?</p> <p>17 Q. Well, the section ovarian</p> <p>18 cancer inflammation at the bottom of</p> <p>19 Page 20, carrying over to the top of</p> <p>20 Page 21.</p> <p>21 A. I see that.</p> <p>22 Q. And there you talk about a</p> <p>23 number of inflammatory markers, correct?</p> <p>24 A. Correct.</p>	<p style="text-align: right;">Page 361</p> <p>1 associated with ovarian cancer.</p> <p>2 BY MR. HEGARTY:</p> <p>3 Q. Well, can you cite for me</p> <p>4 any study that has clinically correlated</p> <p>5 those findings to ovarian cancer risk?</p> <p>6 MS. O'DELL: Objection.</p> <p>7 Asked and answered.</p> <p>8 THE WITNESS: First of all,</p> <p>9 I'm not -- and again, not an</p> <p>10 OB/GYN.</p> <p>11 I can tell you that those</p> <p>12 risk factors, which are</p> <p>13 inflammatory markers, are used as</p> <p>14 an indicator of inflammation as a</p> <p>15 biological plausible mechanism.</p> <p>16 BY MR. HEGARTY:</p> <p>17 Q. Well, do you cite in your</p> <p>18 paper any studies that have --</p> <p>19 A. I'm sorry, do you mean the</p> <p>20 report?</p> <p>21 Q. In your report. Do you cite</p> <p>22 in your report any studies that have</p> <p>23 found that women with these markers have</p> <p>24 a higher -- higher or an increased risk</p>

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<p>1 of ovarian cancer?</p> <p>2 A. Well, what I -- no. But</p> <p>3 what I have found is that in women who</p> <p>4 have ovarian cancer, when they measure</p> <p>5 concurrently or subsequently, that the</p> <p>6 levels of certain inflammatory markers</p> <p>7 are elevated.</p> <p>8 Q. My question was specific to</p> <p>9 women prior to being diagnosed with</p> <p>10 ovarian cancer, has any study shown that</p> <p>11 women with higher levels of these</p> <p>12 inflammatory markers have an increased</p> <p>13 risk of ovarian cancer?</p> <p>14 MS. O'DELL: Objection to</p> <p>15 form.</p> <p>16 THE WITNESS: Not in that</p> <p>17 particular context. But again I'm</p> <p>18 not an OB/GYN.</p> <p>19 BY MR. HEGARTY:</p> <p>20 Q. Has any study shown that</p> <p>21 these inflammatory factors are elevated</p> <p>22 in women using talc on the perineum?</p> <p>23 MS. O'DELL: Objection to</p> <p>24 the form.</p>	<p>1 are a normal product of cell activity,</p> <p>2 correct?</p> <p>3 A. That is correct --</p> <p>4 Q. For example, for many --</p> <p>5 A. -- for many cells.</p> <p>6 Q. -- reactive oxygen species</p> <p>7 increase if we exercise, correct?</p> <p>8 A. As well as antioxidants</p> <p>9 increase, yes.</p> <p>10 Q. The same is true for</p> <p>11 reactive nitrogen species, correct?</p> <p>12 A. Yes.</p> <p>13 Q. These --</p> <p>14 A. It's a matter of degree.</p> <p>15 Q. Reactive oxygen species and</p> <p>16 reactive nitrogen species increase if</p> <p>17 we're under stress, correct?</p> <p>18 A. They have been shown to do</p> <p>19 that, yes.</p> <p>20 Q. And the body has defense</p> <p>21 mechanisms to handle this increase in</p> <p>22 reactive oxygen species and reactive</p> <p>23 nitrogen species, correct?</p> <p>24 MS. O'DELL: Objection to</p>
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<p>1 THE WITNESS: It's not a</p> <p>2 common thing to measure</p> <p>3 inflammatory mediators as a result</p> <p>4 of the common use of talcum powder</p> <p>5 products. So there is no</p> <p>6 indication of that because there</p> <p>7 are no studies of that.</p> <p>8 BY MR. HEGARTY:</p> <p>9 Q. If you look over on Page 24</p> <p>10 of your report under the section Role of</p> <p>11 Oxidants in Ovarian Cancer. Do you see</p> <p>12 that section?</p> <p>13 A. Section C on Page 24?</p> <p>14 Q. Correct.</p> <p>15 A. Yes.</p> <p>16 Q. All the processes that you</p> <p>17 describe in this section occur in</p> <p>18 everyone everyday, correct?</p> <p>19 MS. O'DELL: Object to the</p> <p>20 form.</p> <p>21 THE WITNESS: To a degree,</p> <p>22 yes.</p> <p>23 BY MR. HEGARTY:</p> <p>24 Q. The reactive oxygen species</p>	<p>1 form.</p> <p>2 THE WITNESS: The body has</p> <p>3 antioxidant mechanisms, including</p> <p>4 superoxide dismutase, catalase, et</p> <p>5 cetera, that are -- that elevate</p> <p>6 in response to reactive oxygen</p> <p>7 species. But they can be</p> <p>8 overwhelmed by the amount of ROS</p> <p>9 release.</p> <p>10 BY MR. HEGARTY:</p> <p>11 Q. But it would be improper to</p> <p>12 say that simply by the generation of</p> <p>13 reactive oxygen species or reactive</p> <p>14 nitrogen species, DNA mutations and tumor</p> <p>15 development will occur, correct?</p> <p>16 MS. O'DELL: Object to form.</p> <p>17 THE WITNESS: One couldn't</p> <p>18 say that just by the -- as you</p> <p>19 point out, as the normal -- under</p> <p>20 normal circumstances, endogenously</p> <p>21 within the body, and not in</p> <p>22 response to a particular agent</p> <p>23 does produce these. So one cannot</p> <p>24 say, to answer your question, that</p>

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<p>1 it -- just the presence of</p> <p>2 reactive oxygen species will lead</p> <p>3 to cancer.</p> <p>4 BY MR. HEGARTY:</p> <p>5 Q. What data shows that the</p> <p>6 body's response system to reactive oxygen</p> <p>7 species and reactive nitrogen species is</p> <p>8 unable to handle those species that might</p> <p>9 be generated by talc exposure?</p> <p>10 A. Numerous cell studies and</p> <p>11 numerous animal studies. And you would</p> <p>12 look at that by the level of antioxidants</p> <p>13 that are also present. And if a</p> <p>14 substance such as talcum powder product</p> <p>15 reduces antioxidants, then the cell or</p> <p>16 the tissue is going to be overwhelmed by</p> <p>17 that product.</p> <p>18 Q. Has that process ever been</p> <p>19 shown in vivo?</p> <p>20 A. In a -- I'm not sure if this</p> <p>21 answers your question. I'll do my best</p> <p>22 to answer it. And your question was has</p> <p>23 that process, meaning the process of</p> <p>24 antioxidant change -- is that your</p>	<p>1 of the literature comes from in vivo</p> <p>2 animal studies as well as in vitro cell</p> <p>3 studies. But my role is to -- is to look</p> <p>4 at biological plausibility. And so</p> <p>5 studies that reveal or indicate that</p> <p>6 response in an animal model and in cell</p> <p>7 culture indicates to me that there's no</p> <p>8 likely reason why it could not happen in</p> <p>9 women.</p> <p>10 Q. Okay. At the top of Page 25</p> <p>11 of your report, you say that even a</p> <p>12 single dose of a carcinogen can produce</p> <p>13 effects that are adverse to cells and</p> <p>14 tissue at the site of exposure.</p> <p>15 Do you see where I'm</p> <p>16 reading?</p> <p>17 A. Yes.</p> <p>18 Q. When you say dose, do you</p> <p>19 mean exposure at a dose or volume of</p> <p>20 exposure to a substance that studies have</p> <p>21 proven are adverse to cells and tissues?</p> <p>22 MS. O'DELL: Object to the</p> <p>23 form.</p> <p>24 THE WITNESS: That's a</p>
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<p>1 question?</p> <p>2 Q. No. The process where the</p> <p>3 cell or the tissue is going to be</p> <p>4 overwhelmed, has that process ever been</p> <p>5 shown in vivo in women?</p> <p>6 A. In women?</p> <p>7 Q. Yes.</p> <p>8 MS. O'DELL: Object to the</p> <p>9 form. You can answer.</p> <p>10 THE WITNESS: Certainly in</p> <p>11 animals, but not to my knowledge</p> <p>12 in women.</p> <p>13 I'm sorry. I'm still</p> <p>14 thinking.</p> <p>15 Whenever the antioxidant</p> <p>16 levels are decreased, that is an</p> <p>17 indicator of being overwhelmed by</p> <p>18 the reactive oxygen species or the</p> <p>19 oxidation stress.</p> <p>20 BY MR. HEGARTY:</p> <p>21 Q. And what studies have shown</p> <p>22 the antioxidant levels are decreased in</p> <p>23 women using talc?</p> <p>24 A. In women using talc -- most</p>	<p>1 multiple question. But when I</p> <p>2 refer to even a single dose, I</p> <p>3 mean even a single exposure.</p> <p>4 BY MR. HEGARTY:</p> <p>5 Q. Are you saying there a</p> <p>6 single molecule of the substance?</p> <p>7 A. What I meant in this report</p> <p>8 is even a single exposure. The</p> <p>9 concentration of which could be unknown.</p> <p>10 A single exposure to a certain</p> <p>11 concentration, whatever that</p> <p>12 concentration is, can produce effects.</p> <p>13 I'm not saying can produce cancer. What</p> <p>14 I'm saying is can start the process of</p> <p>15 either inflammation or oxidative stress.</p> <p>16 Q. And to what tissue does that</p> <p>17 single dose need to reach to have the</p> <p>18 adverse effects that you describe there?</p> <p>19 MS. O'DELL: Object to the</p> <p>20 form.</p> <p>21 THE WITNESS: Whatever that</p> <p>22 particular -- it depends upon the</p> <p>23 carcinogen or the inflammagogue</p> <p>24 that one is looking at in terms of</p>

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<p>1 a single exposure. And it depends</p> <p>2 on the susceptibility of the</p> <p>3 tissue. So to answer your</p> <p>4 question, doses or concentration</p> <p>5 to the target tissue is unknown or</p> <p>6 open.</p> <p>7 BY MR. HEGARTY:</p> <p>8 Q. You're not saying that a</p> <p>9 single application of talc to the</p> <p>10 perineum can produce effects that are</p> <p>11 adverse to cells and tissue in the</p> <p>12 ovaries, correct?</p> <p>13 MS. O'DELL: Object to the</p> <p>14 form.</p> <p>15 THE WITNESS: I'm not saying</p> <p>16 that it can't. I think I</p> <p>17 testified earlier that a single --</p> <p>18 depending upon what that product</p> <p>19 is -- in this case we're talking</p> <p>20 about talcum powder product --</p> <p>21 that one exposure, one</p> <p>22 application, one perineal direct</p> <p>23 exposure could in fact trigger the</p> <p>24 cells to start a process leaning</p>	<p>1 A. In women?</p> <p>2 Q. Yes.</p> <p>3 A. I can -- I cannot off the</p> <p>4 top of my head or looking at my report</p> <p>5 tell you that. Again, I just want to</p> <p>6 repeat that my charge was to look at</p> <p>7 biological plausibility and I -- I see</p> <p>8 those effects or processes that you're</p> <p>9 indicating in cells and animal models,</p> <p>10 but I do not have that information with</p> <p>11 humans.</p> <p>12 Q. Are you aware of any study</p> <p>13 correlating the exposures used in those</p> <p>14 cell and animal models to the exposures</p> <p>15 that women would experience with perineal</p> <p>16 application of talc?</p> <p>17 MS. O'DELL: Object to the</p> <p>18 form.</p> <p>19 THE WITNESS: Well, in my</p> <p>20 mind, and in reality, women use</p> <p>21 different amounts, whether it's</p> <p>22 different handfuls. So I can't</p> <p>23 really give you a concentration.</p> <p>24 But there are studies, the in</p>
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<p>1 towards inflammation.</p> <p>2 BY MR. HEGARTY:</p> <p>3 Q. And where the talc -- where</p> <p>4 does the talc need to go in the body to</p> <p>5 trigger that mechanism?</p> <p>6 A. Well, once it gets -- once</p> <p>7 it's applied to the perineal region, it's</p> <p>8 my belief that it then migrates up to</p> <p>9 the -- to the vaginal area. And in the</p> <p>10 vaginal area, it could also start</p> <p>11 mechanisms, gene expression changes in</p> <p>12 the vaginal tissues that could lead to</p> <p>13 inflammation, or it could get to the</p> <p>14 point of the cervix or to the fallopian</p> <p>15 tubes. It causes changes in cells,</p> <p>16 whether it's gene expression or an</p> <p>17 inflammation, at any one of those</p> <p>18 upward -- upward reproductive tract organ</p> <p>19 systems or tissues. They're all made up</p> <p>20 of cells that are susceptible to oxidant</p> <p>21 stress.</p> <p>22 Q. Can you cite to us any study</p> <p>23 that has shown that process in women</p> <p>24 using talc to the perineum?</p>	<p>1 vitro studies, that did use more.</p> <p>2 However, when you're looking</p> <p>3 at toxicology and you're looking</p> <p>4 to define a mechanism or a</p> <p>5 potential mechanism, if you use</p> <p>6 even a higher dose, you're</p> <p>7 still -- you still can elicit the</p> <p>8 same mechanism.</p> <p>9 So perineal application --</p> <p>10 to answer your question, perineal</p> <p>11 application can put a lot or a</p> <p>12 little. But it also depends on</p> <p>13 the frequency and the duration of</p> <p>14 the use.</p> <p>15 BY MR. HEGARTY:</p> <p>16 Q. Doctor, my question, though,</p> <p>17 was, has any study correlated the</p> <p>18 exposures in the animal or cell studies</p> <p>19 to which you are referring to, to show</p> <p>20 that those same exposures are occurring</p> <p>21 in women applying talc to the perineum?</p> <p>22 A. No.</p> <p>23 Q. For purposes of your</p> <p>24 opinions on biological plausibility, do</p>

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<p>1 you rely on the studies that you cite in 2 your report done by Dr. Saed? 3 A. I relied on the information 4 from Dr. Saed. It went into making up my 5 opinion, yes. 6 Q. If those studies were not 7 available to you, would your opinions 8 still be the same? 9 A. As I said, one of the -- one 10 of the manuscripts came after my report. 11 And it was -- I looked at an abstract, so 12 I had information. And other -- others 13 of Dr. Saed's I reviewed. But I would 14 have come to the same conclusion. That 15 was just -- that was supplemental and 16 complementary and compelling. 17 Q. Have you ever cited an 18 abstract in any published article of 19 yours? 20 A. Yes, I have. 21 Q. Are you an expert in the 22 kinds of testing that Dr. Saed has 23 reported in the materials you reviewed? 24 A. Yes, I am.</p>	<p>1 just? 2 BY MR. HEGARTY: 3 Q. Ovarian epithelial -- thank 4 you. 5 Have you ever done studies 6 using any type of ovarian epithelial cell 7 lines? 8 A. I have not. 9 Q. Have you ever done any study 10 using ovarian cancer cell lines? 11 A. I have not. Not personally. 12 Q. What data shows that the 13 doses that Dr. Saed used in his studies 14 are comparable to those to which 15 epithelial ovarian cells would be exposed 16 to via perineal application of talc? 17 MS. O'DELL: Objection to 18 form. 19 THE WITNESS: There was no 20 comparison in his study directly. 21 But if I may, I just want to say, 22 when you're looking at biological 23 plausibility, which was the 24 question that I was asked,</p>
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<p>1 Q. Do you understand that 2 Dr. Saed is an expert for the plaintiffs 3 in this litigation? 4 A. I do understand that from 5 looking at his publication. 6 Q. Did you do anything yourself 7 to verify the reliability of the testing 8 that he performed whose results you have 9 read in his publications? 10 A. I focused my review and 11 reading of the study design, which is -- 12 and the experimental approach, which are 13 key factors for evaluating any study. 14 And I agree with the experimental 15 approach and the study design that he 16 used. 17 He used proper controls. He 18 used a dose-response. He used the proper 19 techniques in analyzing for cell 20 survivability as well as for oxidative 21 stress and gene expression changes. 22 Q. Have you ever done studies 23 using epithelial cell lines? 24 MS. O'DELL: Ovarian or</p>	<p>1 oftentimes higher doses in vitro 2 studies are used to provide a 3 mechanism or a plausibility or 4 feasibility that that can -- that 5 that product, in this case, talcum 6 powder product, can induce 7 inflammation, inflammatory 8 responses and changes in 9 antioxidant levels. 10 So it is not uncommon to use 11 higher doses in in vitro studies 12 than what might be seen in a human 13 for biological plausibility 14 studies. 15 BY MR. HEGARTY: 16 Q. Can you cite any study that 17 has shown the results reported in 18 Dr. Saed's studies in vivo in women using 19 talc? 20 MS. O'DELL: Objection to 21 form. 22 THE WITNESS: May I get 23 Dr. Saed's paper? 24 BY MR. HEGARTY:</p>

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<p>1 Q. Well, I'm actually not 2 asking about Dr. Saed's paper. 3 A. Okay. 4 Q. But my question is -- you've 5 read Dr. Saed's papers, correct? 6 A. Yes, I have. 7 Q. Can you cite for me any 8 study that has shown the results he 9 reports in his studies in women using 10 talc? 11 MS. O'DELL: Object to form. 12 THE WITNESS: His studies 13 were in vitro studies. 14 BY MR. HEGARTY: 15 Q. Are there any such studies 16 looking at the effects in vivo of talc? 17 MS. O'DELL: Objection. 18 THE WITNESS: In vivo in 19 humans or in vivo in animals? 20 BY MR. HEGARTY: 21 Q. In humans. 22 MS. O'DELL: Object to the 23 form. 24 THE WITNESS: When you refer</p>	<p>1 polymorphisms? 2 A. I need to look at my CV 3 again, as being co-investigator. I've 4 worked with other people. I have not 5 performed studies looking at single 6 nucleotide polymorphisms. But I have 7 worked with people who have -- have done 8 them. And if I look at my curriculum 9 vitae, I can tell you if I've been on any 10 publications. 11 Q. Okay. Because of time, just 12 sitting here today, recognizing for the 13 record you haven't looked at your CV, do 14 any such studies come to mind? 15 A. I don't -- I have not done 16 those studies in my own laboratory. 17 Although I'm -- I'm just saying that I 18 may have been on a publication where 19 colleagues of mine have used that -- that 20 method, those methods. 21 Q. Do you have an opinion about 22 talc in single nucleotide polymorphisms 23 or SNPs? 24 MS. O'DELL: Objection.</p>
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<p>1 to such studies, can you tell me 2 which studies -- which types of 3 studies again are you referring 4 to? 5 BY MR. HEGARTY: 6 Q. The cell studies that you 7 reference by Dr. Saed on Page 25 of your 8 report. 9 A. And the question is are 10 there any? 11 Q. Studies in humans showing 12 such effects following application of 13 talc to the perineum. 14 MS. O'DELL: Objection to 15 form. 16 THE WITNESS: Not to my 17 knowledge. 18 Excuse me. You said that 19 was on Page 25 that you were 20 referring to? 21 BY MR. HEGARTY: 22 Q. Correct. 23 Have you ever published a 24 paper discussing single nucleotide</p>	<p>1 THE WITNESS: I think 2 there -- there is literature 3 showing, including in Dr. Saed's 4 papers, that there are single -- 5 and in -- in a paper that looked 6 at women and looked at antioxidant 7 enzymes and they showed there was 8 single nucleotide polymorphism 9 changes in those women. 10 Looking at, I think it was 11 glutathione S-transferase M 1. 12 So what is my -- so if your 13 question is what is my opinion on 14 single nucleotide polymorphisms in 15 ovarian cancer? 16 BY MR. HEGARTY: 17 Q. Well, let me ask a different 18 question. Is your biologic mechanism -- 19 I'm sorry. Is your biologic plausibility 20 opinion between talc and ovarian cancer 21 the process or action that Dr. Saed 22 describes in his studies? 23 A. I believe that it could be 24 adding to the -- the plausibility of the</p>

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<p style="text-align: right;">Page 382</p> <p>1 relationship or of the causation between 2 ovarian cancer and talcum powder 3 products. 4 Q. Well, is it your opinion 5 that the mechanism by which talc can be 6 biologically -- be a biological plausible 7 cause of ovarian cancer, that's cited by 8 Dr. Saed in his cell studies? 9 MS. O'DELL: Objection to 10 form. 11 THE WITNESS: I believe 12 that -- in my opinion and what I'm 13 stating here in the report, is 14 that inflammation is the 15 primary -- one of the primary 16 biological mechanisms. 17 Whether it appears from the 18 literature that single nucleotide 19 polymorphisms may, in fact, play a 20 role. 21 BY MR. HEGARTY: 22 Q. Okay. But is -- is that -- 23 is it your opinion that -- not that they 24 play -- just that they play a role, but</p>	<p style="text-align: right;">Page 384</p> <p>1 topic. I'll introduce the topic each 2 time that I ask you a question. 3 Going back to the Canadian 4 health assessment that you provided to us 5 at the beginning of the day. 6 A. Yes. 7 (Brief interruption.) 8 BY MR. HEGARTY: 9 Q. Doctor, we talked earlier 10 about Canada's health assessment with 11 regard to talc. Are you familiar with 12 the process by which the Canadian 13 authorities do that health assessment? 14 A. I am -- only from what is in 15 the document. 16 Q. Have you ever been a part of 17 that, of a Canadian health assessment 18 like the one shown with talc? 19 A. I've worked with Health 20 Canada. 21 Q. Okay. Have you ever worked 22 with Health Canada on doing a health 23 assessment like that reflected in the 24 document we looked at earlier today?</p>
<p style="text-align: right;">Page 383</p> <p>1 that is the mechanism for biologic 2 plausibility between talc and ovarian 3 cancer? 4 A. I -- I do not believe it 5 is -- it is not my opinion that -- it is 6 my opinion that single nucleotide 7 polymorphisms, along with inflammation 8 and -- and perhaps other mechanisms may 9 be involved that talc is associated with. 10 I focused my -- my opinion 11 on the assessment of inflammation and its 12 role. 13 MR. HEGARTY: Off the record 14 for a minute. 15 THE VIDEOGRAPHER: The time 16 is 4:48 p.m. We are off the 17 record. 18 (Short break.) 19 THE VIDEOGRAPHER: We are 20 back on the record. The time is 21 5:08 p.m. 22 BY MR. HEGARTY: 23 Q. Dr. Zelikoff, I'm going to 24 jump around a little bit from topic to</p>	<p style="text-align: right;">Page 385</p> <p>1 A. No, I have not. 2 Q. Do you know what kind of 3 standards that they apply in determining 4 whether to call -- whether to say whether 5 there's a potential for harm with a 6 substance? 7 A. Just what is in the 8 document. And then I use my own 9 professional judgment, whether I agree 10 with that or not. 11 Q. Did plaintiff's counsel 12 provide you with some scientific and 13 medical literature with regard to talc or 14 ovarian cancer? 15 A. So the question is whether I 16 was provided with some scientific and 17 medical literature with regard -- yes, 18 many of the articles in the binders were 19 provided to me by them. 20 Q. Are you able to identify 21 which of those articles came from 22 plaintiffs' counsel versus which you 23 found on your own? 24 A. I may be able to do that</p>

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<p>1 with some, yes. But this is over a 2 period of, as I said, 2017 to now. 3 Q. With regard to your 4 invoices -- do you have your invoices 5 there? 6 A. I do not. 7 Q. They've been marked as an 8 exhibit. 9 A. Oh. 10 Q. Can someone help her find 11 those invoices? 12 MS. O'DELL: Did you take 13 them back? I don't know that -- 14 there was only one copy. 15 MR. HEGARTY: I don't think 16 I did. I think it was Exhibit 1. 17 MS. O'DELL: The reason I 18 say that is I did not see it 19 during the lunch break when I 20 looked at -- 21 THE WITNESS: I do have the 22 invoices in my binder here. 23 BY MR. HEGARTY: 24 Q. Okay. If you can turn to</p>	<p>1 Q. What are the differences 2 between your current report dated 3 November 16, 2018, and the final report 4 that you provided as shown here back in 5 February of 2018? 6 A. It was -- I own that. It 7 should have said draft report. And the 8 difference is that that's more literature 9 and more time had gone by for the 10 emergence and review of more literature. 11 Q. You go from a reference on 12 February 4, 2018, to the next reference 13 on September 20th -- I'm sorry. Did I 14 say -- let me back up. 15 You go from a reference on 16 February 4, 2018, to the next cite for 17 time on September 20, 2018. Did you 18 review any additional literature between 19 February 4th and September 20, 2018? 20 A. Yes, I'm sure I did. And I 21 also reviewed the production documents 22 within that time. More of the production 23 documents. 24 Q. Your report doesn't show any</p>
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<p>1 your binder, please. 2 A. If I recall. 3 Q. If we can find that exhibit, 4 that would be helpful? 5 MS. O'DELL: I'm not sure 6 there are any invoices in her 7 binder. 8 Is it in the stack that's 9 right there? 10 MR. HEGARTY: No, I don't 11 think so. 12 BY MR. HEGARTY: 13 Q. Yeah invoices. I found it. 14 Your invoices, Doctor, 15 reflect that you prepared a final report 16 delivered on February 4, 2018. 17 Do you see that? 18 A. I do see that. 19 Q. That was almost a year ago, 20 correct? 21 MS. O'DELL: Objection to 22 form. 23 THE WITNESS: Yes. 24 BY MR. HEGARTY:</p>	<p>1 time invoiced between February 4, 2018, 2 and September 20, 2018. Did you spend 3 time reviewing literature or otherwise 4 working on your report that's not 5 contained in your invoices? 6 A. It -- I may have. I did not 7 always invoice for something that I spent 8 maybe an hour on. 9 Q. Are you able to cite for me 10 the sections in your report that you 11 added or changed between the report that 12 you prepared on February 4, 2018, and the 13 November 16, 2018, report? 14 A. Not without seeing both 15 reports side by side. 16 Q. Do you still have a copy of 17 the February 4, 2018, report? 18 A. Not with me. 19 Q. Does it exist? 20 A. It likely does on my 21 computer, yes. 22 Q. You mentioned that you 23 referred to -- that you reviewed Julie 24 Pier's deposition testimony?</p>

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<p style="text-align: right;">Page 390</p> <p>1 A. I said three-quarters of the 2 deposition, half to three-quarters. 3 Q. That was provided to you by 4 counsel for plaintiffs, correct? 5 A. Yes, correct. 6 Q. Do you know how they went 7 about selecting the deposition 8 transcripts to provide to you for 9 purposes of your review in this case? 10 A. I do not. 11 Q. Did you ask for any 12 deposition -- did you ask for the 13 depositions of all experts who have 14 testified in this litigation? 15 MS. O'DELL: Objection to 16 form. 17 THE WITNESS: I did not ask 18 for depositions. 19 Let me -- let me retract 20 that, please. If in reading my 21 literature there was something 22 that I thought might be in a 23 deposition of someone, I asked the 24 plaintiff attorneys if they had</p>	<p style="text-align: right;">Page 392</p> <p>1 Canada, like Exhibit Number 9? 2 A. I'm sorry. 3 MS. O'DELL: Objection to 4 form. 5 THE WITNESS: All I can say 6 is that in working with Health 7 Canada on immunology in my early 8 career days, that I may have used 9 an assessment like that. 10 BY MR. HEGARTY: 11 Q. Can you cite for me, sitting 12 here today, anytime that you -- your 13 opinions were informed by a Health Canada 14 safety assessment or screening 15 assessment? 16 MS. O'DELL: Object to the 17 form. Other than what she said? 18 THE WITNESS: Except for 19 what I said, I cannot recall. 20 BY MR. HEGARTY: 21 Q. Did you review for purposes 22 of your opinions in this case the current 23 National Cancer Institutes position -- 24 healthcare -- healthcare -- health</p>
<p style="text-align: right;">Page 391</p> <p>1 anything in that regard that would 2 lend to my opinion. 3 BY MR. HEGARTY: 4 Q. And did you ever ask for any 5 additional depositions beyond those that 6 were provided? 7 A. No, I did not. 8 Q. Going back to the Health 9 Canada assessment. Have you ever cited 10 to a Health Canada assessment in any 11 written publication of yours? 12 A. Without looking at my 13 publications, I cannot. But I can tell 14 you that coming to mind just sitting 15 here, as I said, I worked with Health 16 Canada, and I worked with them on my 17 research in fish immunology, and it is 18 possible that I cited Health Canada -- 19 Health Canada literature in those 20 publications concerning fish. 21 Q. Sitting here today, can you 22 recall at any point in time when you -- 23 when your opinions were informed by a 24 draft screening assessment by Health</p>	<p style="text-align: right;">Page 393</p> <p>1 professional PDQ, or the NCI PDQ? 2 A. I have seen that recently. 3 Q. I'll mark as Exhibit Number 4 23, a copy of the NCI PDQ that mentions 5 talc. 6 (Document marked for 7 identification as Exhibit 8 Zelikoff-23.) 9 BY MR. HEGARTY: 10 Q. Have you seen what I marked 11 as Exhibit 23 before -- or as of the time 12 that you drafted your report? 13 A. No, sir. 14 Q. Plaintiffs' counsel did not 15 provide you a copy of that? 16 A. Not prior to my report, no. 17 Q. How did you happen -- who -- 18 strike that. 19 Did -- from where did you 20 receive a copy of Exhibit 23 after 21 preparing your report? 22 A. From the plaintiff attorney. 23 Q. Did you ask for it? 24 A. In general, I asked for all</p>

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<p>1 relevant literature and internal 2 information. But I did not specifically 3 ask for the NCI report. 4 Q. When you asked for all 5 relevant information, internal 6 information, was that prior to preparing 7 your expert report? 8 A. That's pretty much on a 9 chronic level, in other words from the 10 time that I was recruited or asked to 11 participate in this, I always asked, "Is 12 there literature? Is there more 13 literature? Here is the literature that 14 I have found," which were quite a number. 15 "Is there anything else that you can add 16 to this?" So I provided literature, and 17 they provided me with literature. 18 Q. You did not find the NCI's 19 PDQ yourself? 20 A. I did not find it myself. 21 Q. Did the NCI PDQ statements 22 on perineal talc exposure inform your 23 opinions in this case? 24 A. As I said, I only saw it</p>	<p>1 A. I reviewed their opinions. 2 I have many questions about how they 3 reached their opinions and what studies 4 they used. 5 If we can just be on the 6 same page in terms of what their opinion 7 is? 8 Q. I'm looking at the section 9 under perineal talc exposure. And my -- 10 my question is -- strike that. 11 I'm looking at the section 12 on perineal talc exposure which is about 13 four pages from the end. 14 A. I see. 15 Q. And my question is only 16 whether that section informed your 17 opinions in this case. 18 MS. O'DELL: Object to the 19 form. 20 THE WITNESS: I reviewed it. 21 It did not change my opinion. 22 Did -- did it inform my opinion? 23 It did not change my opinion. 24 BY MR. HEGARTY:</p>
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<p>1 within the last few days. 2 Q. Understood. But you also 3 reviewed the Saed manuscript, you 4 reviewed the Canadian health assessment. 5 You said both those documents informed 6 your opinions. 7 So my question is, did the 8 NCI PDQ also inform your opinions. 9 MS. O'DELL: Object to the 10 form. 11 THE WITNESS: Well, the -- 12 the documents that you previously 13 mentioned do not inform my opinion 14 prior to my report of 15 November 16th. However, it's 16 information that has added to me 17 to get to this place where I am 18 right now. 19 So my opinion has not 20 changed from my report until 21 sitting here today. 22 BY MR. HEGARTY: 23 Q. Did the NCI PDQ add to your 24 opinions in this case?</p>	<p>1 Q. Do you agree with the NCI 2 PDQ statement on perineal talc exposure? 3 A. If we are talking about 4 their final conclusion? 5 Q. I'm talking -- yes. We can 6 talk about their final conclusion. 7 A. Okay. If I'm recalling 8 this, their final conclusion that -- was 9 that there was no causal relationship 10 between talc -- talcum powder exposure 11 and ovarian cancer. Is that -- 12 Q. Well, the -- the weight of 13 the evidence does not support an 14 association between perineal talc 15 exposure and an increased risk of ovarian 16 cancer. Do you agree with that 17 statement? 18 A. I do not agree with that 19 statement. 20 And I find, in reading this 21 document, that I'm not sure how they 22 reached that conclusion. On several 23 points, if you're interested. 24 One is --</p>

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<p>1 Q. No, I'm just asking you 2 whether you agreed with it. 3 A. I do not agree with their 4 final conclusion. 5 Q. Neither FDA nor any 6 scientific regulatory or other group has 7 ever sought out your opinions with regard 8 to the biologic plausibility of talc and 9 ovarian cancer, correct? 10 A. That is correct. 11 Q. You made reference earlier 12 to the Penninkilampi article. Do you 13 recall that? 14 A. I recall mentioning it, yes. 15 Q. I'm going to mark as 16 Exhibit 34 a copy of the Penninkilampi 17 article. That's the article that you 18 were talking about earlier, correct? 19 A. 2018, correct. 20 (Document marked for 21 identification as Exhibit 22 Zelikoff-34.) 23 BY MR. HEGARTY: 24 Q. If you turn over to page --</p>	<p>1 A. Yes, I do. 2 Q. Third line down it says, 3 "The mechanism by which perineal talc use 4 may increase the risk of ovarian cancer 5 is uncertain." 6 Do you agree with that 7 statement? 8 MS. O'DELL: Objection to 9 form. 10 THE WITNESS: I think 11 there's no -- in providing 12 biological plausibility, 13 biological plausibility, in and of 14 itself, says that there is a 15 possible mechanism or action that 16 could provide evidence for the 17 causation. 18 So the mechanism by which 19 perineal talc use may increase the 20 risk of ovarian cancer is 21 uncertain. It does not mean 22 it's -- it means it's uncertain, 23 that there are many viewpoints on 24 it.</p>
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<p>1 strike that. 2 This is an article that you 3 rely on for purposes of your opinions in 4 this case, correct? 5 A. This is an article that I 6 reviewed and played into, yes, informed 7 my opinions. 8 Q. Did you find it to be a 9 reliable source of information? 10 MS. O'DELL: Object to the 11 form. 12 THE WITNESS: I found no 13 problems in the study design as I 14 read it. 15 Again, I'm not an 16 epidemiologist. So getting into 17 the nuances of this. I'm a 18 toxicologist and I depend on my 19 epidemiology colleagues to fill in 20 the gaps. 21 BY MR. HEGARTY: 22 Q. Over on Page 45, under the 23 section Discussion. Do you see that 24 section?</p>	<p>1 BY MR. HEGARTY: 2 Q. At the very -- in the very 3 last line of that article -- I'm sorry, 4 the very last line of that paragraph it 5 says, "The potential mechanism by which 6 genital talc is associated with an 7 increased risk of ovarian cancer hence 8 remains unclear." 9 Do you agree with that 10 statement? 11 A. I think there is -- in -- in 12 regards to your previous questions that 13 asked me if it was -- if there was an 14 agreement among the medical population, 15 and I said that I didn't know that there 16 was agreement or was not agreement. I 17 thought that there were not agreement. 18 So I agree with the statement that there 19 is still room for further study. 20 Unclear does not mean 21 unknown or that there are not biological 22 plausible mechanisms that could be 23 entertained. 24 Q. Is inflammation part of a</p>

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<p>1 normal mechanism of response to the 2 presence of particles in the lungs? 3 A. Depending upon the particle, 4 inflammation can be a normal part of a 5 response, yes. 6 Q. Can tumors occur in the 7 respiratory system with very high 8 exposure to particles that overwhelm the 9 body's clearance mechanisms and lead to 10 particle overload of lung macrophages? 11 A. Are you referring to the NTP 12 study? 13 Q. I'm not referring to any 14 study in particular. That was just a 15 question in general. 16 A. Okay. Can you repeat the 17 question? 18 Q. Yeah. Can tumors occur in 19 the respiratory system with very high 20 exposure to particles that overwhelm the 21 body's clearance mechanisms and lead to 22 particle overload of lung macrophages? 23 MS. O'DELL: Object to form. 24 THE WITNESS: That is a --</p>	<p>1 statement in the third paragraph at the 2 end that says even incidental -- the 3 third paragraph at the end. 4 A. I was looking for a pen. 5 Excuse me. 6 Okay. Go ahead. 7 Q. Says, "Even incidental 8 contamination by amphibole forms of 9 asbestos is hazard enough to cause 10 asbestos-related illnesses." 11 Do you see where I'm 12 reading? 13 A. I'm sorry, are you in the 14 first paragraph? 15 Q. Third paragraph. 16 A. Third paragraph. 17 Q. At the end. 18 A. At the -- traces of these 19 types of asbestos are -- 20 Q. No, third paragraph. 21 Even -- the last line. "Even incidental 22 contamination by amphibole forms of 23 asbestos is hazard enough to cause 24 cancer-related illnesses."</p>
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<p>1 that has been seen as a 2 potential -- as a potential to 3 occur, yes. 4 BY MR. HEGARTY: 5 Q. Are there any publications 6 that indicate such a mechanism of 7 particle overload can occur in the 8 ovaries? 9 MS. O'DELL: Objection to 10 form. 11 THE WITNESS: No studies 12 that I'm aware of that -- that 13 refer to particle overload in the 14 ovaries in this regard, in regard 15 to talcum powder. There's 16 evidence, of course, as I said 17 that there is talcum powder in the 18 ovary. 19 BY MR. HEGARTY: 20 Q. Over on Page 5 of your 21 report, Exhibit 2. 22 A. Page headed by Section 4, 23 Asbestos? 24 Q. Correct. You make a</p>	<p>1 Do you see where I'm 2 reading? 3 A. Says, "Cause 4 asbestos-related illnesses." 5 Q. I'm sorry. "Can cause 6 asbestos-related illnesses." You cite -- 7 A. I see where you are reading. 8 Q. -- the Rohl and Langer 9 paper? 10 A. Yes. 11 Q. I'll mark as Exhibit 35 the 12 Rohl and Langer paper that you've cited. 13 (Document marked for 14 identification as Exhibit 15 Zelikoff-35.) 16 BY MR. HEGARTY: 17 Q. Doctor, nowhere in that 18 paper did the author say that incidental 19 contamination by amphibole forms of 20 asbestos is hazard enough -- hazardous 21 enough to cause asbestos-related 22 illnesses, do they? 23 MS. O'DELL: Objection to 24 form.</p>

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<p>1 THE WITNESS: I'm sorry, I'm 2 not certain that this is the same 3 paper. This is Rohl, et al. The 4 paper that I cited is Rohl and 5 Langer. 6 BY MR. HEGARTY: 7 Q. It's dated 1976 -- 8 A. 1976. 9 Q. -- correct? 10 A. That's correct. 11 Q. If you look in the abstract 12 of that paper -- 13 A. Yes. The paper -- 14 Q. -- the paper that I marked 15 as Exhibit 35. 16 A. Rohl, et al, yes. 17 Q. Yes. It says, "It's 18 possible adverse health effects from 19 intermittent use of these products, 20 especially those that contain asbestiform 21 and fragmented anthophyllite, tremolite, 22 chrysotile, quartz, and trace minerals 23 are presently unknown and warrant 24 evaluation."</p>	<p>1 Many investigators, 2 including myself, have papers that come 3 out the same year but with different 4 authors. 5 Q. If you -- you turn over to 6 Page 6 of your report. 7 A. Yes, sir. 8 Q. At the end of the first 9 paragraph, at the top of the page. 10 A. Yes. 11 Q. You say that "the close 12 proximity of asbestos in talc and mineral 13 deposits makes extraction of either 14 material alone difficult, if not 15 impossible." 16 Do you see where I'm 17 reading? 18 A. Yes, I do. 19 Q. Is it your testimony that it 20 is impossible to extract talc from 21 mineral deposits without asbestos? 22 MS. O'DELL: Objection to 23 form. 24 THE WITNESS: I'm not a --</p>
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<p>1 Did I read that correctly? 2 A. I'm sorry, you are in the 3 abstract, but I don't know what line you 4 are on. 5 Q. The very last line of the 6 abstract. 7 A. "Possible adverse health 8 effects from intermittent use of these 9 products especially those that contain 10 asbestiform and fragmented anthophyllite, 11 tremolite, chrysotile, quartz, and trace 12 minerals are presently unknown and 13 warrant evaluation." 14 Yes. This is also dated 15 1976. 16 Q. Which is the date that you 17 cite to the Rohl and Langer paper? 18 A. Yes, I -- I understand that, 19 sir. However, because this is a Rohl et 20 al., it is certainly possible that I 21 miscited and it was Rohl et al. But my 22 citation in there is Rohl and Langer. So 23 it may have been an error on my part. 24 However, there's pause.</p>	<p>1 I'm not a geologist. I cannot -- 2 I can only rely on the references 3 that are there. 4 BY MR. HEGARTY: 5 Q. Can you list all the steps 6 used in the processing of pharmaceutical 7 grade talc? 8 A. I can give you an overview. 9 But again, I'm not a commercial talc 10 production person, nor am I a geologist, 11 nor am I in the industry. So I can only 12 give you a superficial glimpse. 13 Q. Can you describe the 14 beneficiation for talc? 15 MS. O'DELL: Objection to 16 form. Asked and answered. 17 THE WITNESS: Not in -- not 18 in detail. I only know in general 19 that there is -- actually, I 20 prefer not to answer that at all 21 because I don't want to be 22 inaccurate. It's not my field. 23 BY MR. HEGARTY: 24 Q. Can you turn over to Page 7</p>

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<p>1 of your report. 2 In the second paragraph you 3 refer to the deposition of Alice Blount. 4 Do you see that? 5 A. Yes, I do. Second sentence. 6 Q. And you contend that the 7 sample she tested claimed to include 8 asbestos, including asbestos in Johnson's 9 Baby Powder. Do you see where you make 10 that reference? 11 A. Yes, I'm citing her 12 deposition. 13 Q. Did you read the entirety of 14 her deposition? 15 A. No, sir. 16 Q. What testing method did she 17 use? 18 A. I'd like to see the 19 deposition again. 20 Q. Did you see from her 21 deposition where she testified that her 22 results published in 1991 came from a 23 Johnson's Baby Powder bottle purchased in 24 1996?</p>	<p>1 Q. You read every word of it? 2 A. I reviewed it. And I read 3 it to the best of my ability. 4 Q. You make reference there to 5 Exhibits 47 and 28, 47 from Julie Pier 6 deposition and 28 from Dr. Hopkins' 7 deposition. 8 Do you see that? 9 A. Yes, I do. 10 Q. Do you know who prepared 11 those exhibits? 12 A. I do not. I would make an 13 assumption that it was attorneys. 14 Q. Were you aware that they 15 were prepared by counsel for plaintiffs? 16 MS. O'DELL: Objection to 17 form. 18 THE WITNESS: As the 19 questions were asked by some of 20 the attorneys for the plaintiff, I 21 would make that assumption. 22 BY MR. HEGARTY: 23 Q. Did you do anything yourself 24 to verify the accuracy of the information</p>
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<p>1 A. You know, I'm waiting for 2 the -- see the article, please. 3 Q. Let me withdraw the 4 question. I don't have time to cover 5 that. 6 If you turn over to -- if 7 you look at Page 7, the second-to-last 8 paragraph you make reference there to the 9 testimony of Dr. Hopkins and the 10 testimony of Julie Pier. 11 Do you see that? 12 A. I see reference to 13 Dr. Hopkins in the third sentence. And 14 in the same paragraph, I see on the last 15 sentence, deposition of Julie Pier, 16 corporate representative of Imerys. 17 Q. You've already testified 18 that you have not completed reading the 19 deposition of Julie Pier, correct? 20 A. I have testified to that, 21 yes. 22 Q. Did you read the entirety of 23 the deposition of Dr. Hopkins? 24 A. I read the entirety, yes.</p>	<p>1 in any of those exhibits? 2 A. I'm not sure what you mean 3 did I do anything myself. I read them, 4 and I did not do any further literature 5 searching, if that's what you mean. 6 Q. Did you review the test 7 results themselves that are supposedly 8 reported in those two exhibits? 9 MS. O'DELL: Objection to 10 form. 11 THE WITNESS: Did I review 12 the testing methodology? I did 13 not review it in the sense that I 14 did further literature searching, 15 but I -- I looked at and reviewed 16 the testing methods that they -- 17 that they said they used. 18 BY MR. HEGARTY: 19 Q. Did you actually pull the 20 tests that are referenced in those 21 exhibits and look at the test results 22 yourself? 23 A. I did not. 24 Q. Are you aware that in 2009</p>

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<p style="text-align: right;">Page 414</p> <p>1 FDA pulled -- did its own testing with 2 regard to asbestos and talc? 3 A. I am aware of that. 4 Q. Did you review the results 5 of those tests? 6 A. I did review the results. 7 It doesn't come to mind right now. I'd 8 like to see a copy of it, if I may. 9 Q. Nowhere in your report do 10 you cite those test results, do you? 11 A. Not that I can recall. 12 I do cite a paper or a 13 comment by Epstein writing to the FDA in 14 here. And the FDA's response in terms of 15 migration. 16 But in answer to your 17 question -- can you repeat your question? 18 Q. Sure. Did you cite -- you 19 agree that you didn't cite anywhere -- 20 strike that. 21 You did not cite anywhere in 22 your report the results of the FDA's 23 testing of talc in 2009, correct? 24 A. It doesn't appear so, no.</p>	<p style="text-align: right;">Page 416</p> <p>1 THE WITNESS: There are many 2 studies that IARC used, not just 3 worker study populations. 4 BY MR. HEGARTY: 5 Q. But their conclusion with 6 regard to designating talc -- sorry, 7 designating asbestos as Category 1 was 8 based on five cohort studies involving 9 heavy industrial exposure, correct? 10 A. The preponderance -- or the 11 weight -- the weight of evidence was 12 contributed among all studies, but it's 13 my -- it's my thought that the worker 14 studies were probably weighted as heavy 15 as any others. 16 Q. You agree -- you agree that 17 nowhere in your report do you analyze 18 what asbestos exposure levels had been 19 shown to induce a biologically plausible 20 effect in tissues, correct? 21 MS. O'DELL: Object to the 22 form. 23 THE WITNESS: Again, what do 24 you mean by analyze?</p>
<p style="text-align: right;">Page 415</p> <p>1 Q. Did you have that 2 information before you finalized your 3 report? 4 A. I'm not certain. Probably 5 yes. 6 Q. Did you review all the 7 epidemiologic literature looking at 8 asbestos exposure and ovarian cancer? 9 A. Well, as I said, I'm not an 10 epidemiologist. So I looked at several 11 of the meta-analyses, including 12 Dr. Taher. 13 Q. Did you read all the 14 meta-analyses that had been published 15 with regard to asbestos and ovarian 16 cancer? 17 A. No, I have not. 18 Q. The medical literature 19 looking at asbestos exposure and ovarian 20 cancer was based on exposure to -- was 21 based on a heavy industrial exposure, 22 correct? 23 MS. O'DELL: Objection to 24 form.</p>	<p style="text-align: right;">Page 417</p> <p>1 BY MR. HEGARTY: 2 Q. Well, nowhere do you cite 3 studies in your report reporting on the 4 effect of asbestos in tissues, correct? 5 A. I certainly do talk about 6 asbestos. If you give me a minute to 7 review. 8 I talk about it on Page 7 9 being listed as a Group 1 carcinogen. 10 Q. My question is nowhere in 11 your report do you analyze the studies 12 that look at the toxicity or discuss the 13 toxicity of asbestos in human tissue, 14 correct? 15 MS. O'DELL: Object to the 16 form. 17 THE WITNESS: I -- I did not 18 look at -- I did not analyze in 19 depth, no, the studies that are 20 associated with the IARC report, 21 if that's what you're asking. 22 BY MR. HEGARTY: 23 Q. What type of chromium -- 24 strike that.</p>

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<p>1 Is chromium-6 in Johnson's 2 Baby Powder? 3 A. Chromium is in Johnson's 4 Baby Powder. 5 Q. I'm sorry? 6 A. Chromium is present. 7 Q. Is chromium-6 present in 8 Johnson's Baby Powder? 9 A. There are indications. They 10 just discuss total chromium. 11 Q. Can you testify here today 12 that Johnson's Baby Powder has chromium-6 13 in it? 14 MS. O'DELL: Object to the 15 form. 16 THE WITNESS: Again, not 17 being a geologist and only going 18 by the internal documents, and if 19 I may also look at one of the 20 exhibits that has the data for the 21 metals. I'm sorry. 22 MS. O'DELL: It's Exhibit C 23 that was marked. 24 THE WITNESS: I don't want</p>	<p>1 Q. Of your report. The third 2 paragraph from the bottom where it 3 begins, "Chromium-3." 4 A. Yes. 5 Q. You say, "Chromium-3 has 6 weak cell membrane permeability, allowing 7 it to cross the cell membrane in order to 8 bind to DNA and cause lesions." That's 9 not correct, is it? 10 A. That is not correct. That 11 is an error on my part in the report. 12 Chromium-3 has strong membrane 13 permeability. And when you asked me the 14 question initially whether there was an 15 error in my report, I should have looked 16 at it, and that is an error. Yes. 17 Q. In fact chromium-3 does not 18 cross the cell membrane, correct? It's 19 unable to cross the cell membrane? 20 A. Chromium-6 crosses the cell 21 membrane and then converts into -- is 22 oxidized to chromium-3. And chromium-3 23 is the actual component which causes the 24 instability.</p>
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<p>1 to go by my memory alone. I'd 2 like to see that. 3 Thank you very much. 4 In the document prepared as 5 Exhibit C, chromium has not been 6 speciated and it's listed as total 7 chromium. I would make the 8 assumption from my professional 9 opinion that in mining, you do get 10 both chromium-6 and chromium-3 11 when you have -- when you're 12 mining talc. But I'm not a 13 geologist. 14 BY MR. HEGARTY: 15 Q. Does chromium-6 only come 16 through industrial processing? 17 A. No. It can actually be 18 found in the soil as a product of 19 contamination. 20 Q. If you look over -- 21 A. And it can be re-oxidized. 22 Yes. 23 Q. If you look over on Page 9? 24 A. Of?</p>	<p>1 Q. But chromium-3 is unable to 2 cross the cell membrane, correct? 3 A. Completely. To some degree 4 it has -- it can cross to some -- some 5 minimal degree. But it's hexavalent 6 chromium which can cross -- which has 7 great capacity to cross the cell 8 membrane, yes. 9 May I take a minute, please. 10 Let me -- let me restate 11 based upon the third paragraph that 12 starts, "Chromium-3 has weak cell 13 membrane permeability." 14 It has weak to no cell 15 membrane permeability. 16 It is the active oxidized 17 product of hexavalent chromium or 18 chromium-6, that along with chromium-4 19 and chromium-5 which is responsible for 20 genetic instability and oxidative stress. 21 So it's chromium-3. 22 Q. If you turn over to Page 23 13 -- I'm sorry, Page 12 of your report. 24 Section entitled C, Fragrances?</p>

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<p>1 A. Yes.</p> <p>2 Q. As of the time you prepared</p> <p>3 your report, your entire opinions with</p> <p>4 regard to fragrances was based on the</p> <p>5 report by Michael Crowley, correct?</p> <p>6 A. That is correct.</p> <p>7 Q. You understand --</p> <p>8 A. And, and what I know about</p> <p>9 some of the components from other --</p> <p>10 other studies.</p> <p>11 Q. Have you had any prior work</p> <p>12 experience with him?</p> <p>13 A. Dr. Michael Crowley?</p> <p>14 Q. Yes.</p> <p>15 A. No.</p> <p>16 Q. Do you know anything about</p> <p>17 his qualifications beyond -- beyond what</p> <p>18 you read in his report?</p> <p>19 A. No. Just in his report and</p> <p>20 the information that he gives about</p> <p>21 himself. And the questions that were</p> <p>22 asked to him and the responses.</p> <p>23 Q. You say that you concur --</p> <p>24 "I concur with his opinion." Does that</p>	<p>1 expert witness report in litigation?</p> <p>2 MS. O'DELL: Object to the</p> <p>3 form.</p> <p>4 THE WITNESS: I am trying to</p> <p>5 recall whether or not I have ever</p> <p>6 had that opportunity.</p> <p>7 BY MR. HEGARTY:</p> <p>8 Q. Sitting here right now, can</p> <p>9 you recall when you had such an</p> <p>10 opportunity?</p> <p>11 A. In this particular setting</p> <p>12 of being deposed?</p> <p>13 Q. Or in any -- in any setting</p> <p>14 where you are concurring with the opinion</p> <p>15 of someone who -- who comments on</p> <p>16 toxicity in an expert witness report</p> <p>17 written for litigation?</p> <p>18 MS. O'DELL: Objection to</p> <p>19 form.</p> <p>20 THE WITNESS: I would --</p> <p>21 I -- I would comment on it if I</p> <p>22 agreed.</p> <p>23 And in this case, you know,</p> <p>24 having the knowledge base that I</p>
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<p>1 mean that you agreed with everything that</p> <p>2 he says in his report?</p> <p>3 MS. O'DELL: Object to the</p> <p>4 form.</p> <p>5 THE WITNESS: I concur with</p> <p>6 his statement which says that</p> <p>7 "some of these chemicals in</p> <p>8 fragrances may contribute to the</p> <p>9 inflammatory response, toxicity</p> <p>10 and potential carcinogenicity of</p> <p>11 Johnson & Johnson talcum powder</p> <p>12 products."</p> <p>13 And that's based on the</p> <p>14 knowledge of some of the chemicals</p> <p>15 as I said that I've reviewed for</p> <p>16 other studies and personal</p> <p>17 studies. And they are indeed</p> <p>18 inflammatory and can cause</p> <p>19 toxicity.</p> <p>20 BY MR. HEGARTY:</p> <p>21 Q. Prior to reading</p> <p>22 Dr. Crowley's report, had you ever</p> <p>23 concurred with a finding as to toxicity</p> <p>24 of a substance based on the reading of an</p>	<p>1 have, not on -- certainly not on</p> <p>2 all 150 different chemicals, which</p> <p>3 is why I did my own literature</p> <p>4 search, but on the chemicals that</p> <p>5 I do know, I did agree with the</p> <p>6 fact that they -- they do</p> <p>7 contribute to inflammatory</p> <p>8 responses, toxicity, some are</p> <p>9 cytotoxic and produce cell injury</p> <p>10 and potential carcinogenicity.</p> <p>11 So as ethyl benzene as one</p> <p>12 of the ingredients or one of the</p> <p>13 constituents in fragrances, is</p> <p>14 listed as a type -- as a Class 2</p> <p>15 carcinogen. So I did agree with</p> <p>16 it.</p> <p>17 If I had any question, I did</p> <p>18 my own search.</p> <p>19 BY MR. HEGARTY:</p> <p>20 Q. Over on page -- Pages 12 and</p> <p>21 13, again you discuss exposure routes of</p> <p>22 talc either through perineal exposure or</p> <p>23 through inhalation, correct? And that</p> <p>24 carries over to Pages 14 and 15, and 16</p>

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<p>1 and 17.</p> <p>2 A. Okay.</p> <p>3 Q. So in that section, did you</p> <p>4 in any way analyze whether the particles</p> <p>5 that -- whether talc can transport in the</p> <p>6 same way that the particles do in the</p> <p>7 studies that you cite?</p> <p>8 MS. O'DELL: Objection to</p> <p>9 form.</p> <p>10 BY MR. HEGARTY:</p> <p>11 Q. In other words, did you cite</p> <p>12 any authority showing that talc particles</p> <p>13 transport in the same way as the</p> <p>14 particles you reference in these studies?</p> <p>15 A. Not conclusively. But as I</p> <p>16 said, if the particles are of similar</p> <p>17 sizes, which they are in these -- in</p> <p>18 these animal studies, then I would have</p> <p>19 no reason to believe that the talc</p> <p>20 particles did not move in the same</p> <p>21 manner.</p> <p>22 Q. Well, do you agree that it</p> <p>23 is important when talking about transport</p> <p>24 of particles, that -- strike that. Let</p>	<p>1 that are applied to talc via the perineal</p> <p>2 route?</p> <p>3 A. What I did was I looked at</p> <p>4 the internal documents, found that the --</p> <p>5 according to the -- the instrumentation</p> <p>6 and the graphics that they did, as well</p> <p>7 as Dr. Longo, and looked at the size</p> <p>8 range of the particles. As I said, the</p> <p>9 median and the average is around 10.5 to</p> <p>10 11.5, but there were particle size range</p> <p>11 in the talc -- talcum powder products</p> <p>12 that range all the way from 50 microns or</p> <p>13 larger all the way down to 0.3 microns or</p> <p>14 300 nanometers.</p> <p>15 Q. Well, did you do any</p> <p>16 correlation to determine whether the --</p> <p>17 the size of the particles studied in</p> <p>18 the -- in the articles you cite in any</p> <p>19 way correlate or relate to the particle</p> <p>20 sizes in Johnson's Baby Powder?</p> <p>21 MS. O'DELL: Object to the</p> <p>22 form.</p> <p>23 THE WITNESS: The size of</p> <p>24 particles that were used in many</p>
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<p>1 me ask it a different way.</p> <p>2 You cite to an authority</p> <p>3 that makes the following statement, I</p> <p>4 don't want to ask you -- I want to ask</p> <p>5 you if you agree with it.</p> <p>6 A. Okay.</p> <p>7 Q. In an experiment to</p> <p>8 evaluate --</p> <p>9 A. I'm sorry. What page?</p> <p>10 Q. It's -- it's not on -- it's</p> <p>11 not in your report. It's part of my</p> <p>12 question.</p> <p>13 A. Okay.</p> <p>14 Q. Do you agree that in an</p> <p>15 experiment to evaluate the translocation</p> <p>16 of solid particles, the characteristics</p> <p>17 of the particle, i.e., size and material,</p> <p>18 should be considered carefully?</p> <p>19 A. I agree that the size should</p> <p>20 be considered very carefully.</p> <p>21 Q. And did you do any</p> <p>22 comparison with the size of particles</p> <p>23 that are referenced in the literature</p> <p>24 that you cite, to the size of particles</p>	<p>1 of the animal studies certainly</p> <p>2 fall within the range that I just</p> <p>3 gave you.</p> <p>4 BY MR. HEGARTY:</p> <p>5 Q. Well, a number of the animal</p> <p>6 studies used nanoparticles, correct?</p> <p>7 A. They used .1 micron, but</p> <p>8 they also used larger particles.</p> <p>9 Q. Is it your testimony that</p> <p>10 there are nanoparticles of talc in</p> <p>11 Johnson's Baby Powder?</p> <p>12 A. If a particle -- a particle</p> <p>13 is considered an ultra fine particle if</p> <p>14 it's .1 micron or less.</p> <p>15 Q. But my question is as to</p> <p>16 nanoparticles. Are there nanoparticles</p> <p>17 in Johnson's Baby Powder?</p> <p>18 A. Not that your literature</p> <p>19 showed. But ultra fines are also -- can</p> <p>20 be called nanoparticles because they go</p> <p>21 as low as .1.</p> <p>22 Q. If you look over on Page 14</p> <p>23 of your report, you cite in the second</p> <p>24 paragraph a letter from FDA to</p>

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<p>1 Dr. Epstein, correct?</p> <p>2 A. That's correct.</p> <p>3 Q. I marked as Exhibit</p> <p>4 Number 33 a copy of that letter.</p> <p>5 (Document marked for</p> <p>6 identification as Exhibit</p> <p>7 Zelikoff-33.)</p> <p>8 BY MR. HEGARTY:</p> <p>9 Q. Is that a copy of the letter</p> <p>10 that you are referencing in that</p> <p>11 paragraph?</p> <p>12 A. If you could point me to the</p> <p>13 paragraph, please.</p> <p>14 Q. Well, it's the second --</p> <p>15 it's the second paragraph at the top of</p> <p>16 Page 14.</p> <p>17 A. Stating "further evidence</p> <p>18 for migration"?</p> <p>19 Q. Correct.</p> <p>20 A. Okay. Yes. This is the</p> <p>21 letter that I'm referring to.</p> <p>22 Q. In the same paragraph that</p> <p>23 you reference, where you make -- where</p> <p>24 you -- in the same paragraph where you</p>	<p>1 A. I did not.</p> <p>2 Q. Why not?</p> <p>3 A. And in terms of my report,</p> <p>4 and talking about migration, again, the</p> <p>5 ovarian cancer and cogent biological</p> <p>6 mechanism was not appropriate for that,</p> <p>7 where I cited the original statement.</p> <p>8 Q. But you cite elsewhere in</p> <p>9 your report statements and studies you</p> <p>10 contend support your opinion that there</p> <p>11 is a biologically plausible mechanism</p> <p>12 between talc and ovarian cancer, correct?</p> <p>13 A. Yes, I do.</p> <p>14 Q. This statement by FDA</p> <p>15 concerns whether there's a biologically</p> <p>16 plausible mechanism between talc and</p> <p>17 ovarian cancer, correct?</p> <p>18 A. That is -- that is what the</p> <p>19 FDA says, yes.</p> <p>20 Q. Did you cite FDA's statement</p> <p>21 about -- as to its view of whether a</p> <p>22 cogent biological mechanism exists</p> <p>23 anywhere in your report?</p> <p>24 A. I did not cite this</p>
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<p>1 pull out the statement that you cite</p> <p>2 here, "FDA states that while there exists</p> <p>3 no direct proof of talc in ovarian</p> <p>4 carcinogenesis" --</p> <p>5 A. Genesis?</p> <p>6 Q. Genesis, carcinogenesis.</p> <p>7 It's getting late for me too.</p> <p>8 Did you cite that finding by</p> <p>9 FDA in this paragraph?</p> <p>10 A. No. What I was trying to</p> <p>11 cite was referring to migration through</p> <p>12 the upper genital tract. So citing the</p> <p>13 information on carcinogenesis would not</p> <p>14 have been appropriate in that paragraph.</p> <p>15 Q. If you turn over to Page 4</p> <p>16 of the FDA's letter. At the very bottom</p> <p>17 FDA states, "A cogent biological</p> <p>18 mechanism by which talc might lead to</p> <p>19 ovarian cancer is lacking."</p> <p>20 Do you see that?</p> <p>21 A. I do see that.</p> <p>22 Q. You do not cite that</p> <p>23 statement anywhere in your report,</p> <p>24 correct?</p>	<p>1 statement.</p> <p>2 Q. You cite one statement by</p> <p>3 FDA that you believe they are correct</p> <p>4 about?</p> <p>5 A. They put a lot of weight</p> <p>6 into that statement and...</p> <p>7 Q. Well, how did you weigh that</p> <p>8 statement versus the other statement that</p> <p>9 I read at the bottom of Page 4?</p> <p>10 A. Sorry, I'd like to find it.</p> <p>11 And repeat the question</p> <p>12 please.</p> <p>13 Q. How did you weigh the</p> <p>14 statements you cite about migration</p> <p>15 versus the other statement that I read at</p> <p>16 the bottom of Page 4 about a cogent</p> <p>17 biologic mechanism?</p> <p>18 A. In terms of the migration,</p> <p>19 this is something that not only has been</p> <p>20 found by the FDA and -- and is being</p> <p>21 reiterated as a result of numerous</p> <p>22 studies, this, Number 4, a cogent</p> <p>23 biological mechanism by which talc led to</p> <p>24 ovarian cancer is lacking is the FDA's</p>

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<p>1 opinion in 19 -- in 2014, and I did not 2 know at all how they came to that 3 conclusion. 4 So in terms of migration, 5 that's been ferreted out and it's well 6 known in the literature for migration of 7 particles. But the -- their opinion, the 8 FDA's opinion on this, I could not 9 substantiate in terms of what they were 10 basing that conclusion on. 11 Q. What methodology did you use 12 to determine which of the statements by 13 FDA in this letter you believed are 14 correct and which you believed are not 15 correct? 16 MS. O'DELL: Object to the 17 form. 18 THE WITNESS: Well, if it 19 was a common finding such as that 20 which particles can migrate which 21 has been shown since late 1990s, 22 versus information that is given 23 in this report and is the basis -- 24 and is what the FDA is opining on,</p>	<p>1 scrutiny. I think that for what they 2 did, they did a good study. 3 Q. If you look at Page 3 of the 4 FDA letter. 5 A. Okay. 6 Q. At the bottom, do you see 7 they comment on the very NTP study -- 8 A. Yes. 9 Q. -- that you just mentioned, 10 right? 11 MS. O'DELL: Which page are 12 you on? 13 MR. HEGARTY: Page 3. 14 THE WITNESS: There were a 15 number -- 16 BY MR. HEGARTY: 17 Q. I'm not -- I'm haven't asked 18 a question. 19 A. Oh, I'm sorry. 20 Q. My question was simply, do 21 you see where they comment on that NTP 22 study? 23 A. I see that, yes. 24 Q. Do you cite anywhere in your</p>
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<p>1 however, I don't know what the -- 2 what the literature is that they 3 reached in that conclusion. 4 BY MR. HEGARTY: 5 Q. IARC includes a citation in 6 its 2010 monograph saying essentially 7 that the evidence of migration to the 8 ovaries is weak. Do you recall reading 9 that? 10 A. I do not recall reading 11 that. I've reviewed the IARC paper, but 12 I -- I do not recall. And I could look 13 at it and tell you what I thought. 14 Q. You made reference earlier 15 in the deposition to the 1992 NTP study, 16 correct? 17 A. Yes. 18 Q. Do you find that to be a 19 well-done study? 20 A. For what it was, I do find 21 it to be a well-done study. I've worked 22 with the NTP. I've served as an advisory 23 board member. And I think that the work 24 they do are -- is with rigor and</p>	<p>1 report FDA's commentary on the NTP study? 2 A. I can find it in my report. 3 I did comment on some of the other that 4 there's been some controversy by 5 Dr. Warheit and Dr. Goodman. They had 6 some pushback on this. I think I 7 commented on that, but I'd like to find 8 the page where I said that. 9 Q. You agree that you didn't 10 cite to FDA's commentary about the NTP 11 study in its February 14, 2014, letter? 12 A. Not -- not that I recall, 13 no. But as I said, I did comment on 14 other -- their -- the FDA's comments are 15 very similar to those made by other 16 scientists. 17 Q. You say the FDA's comments 18 are very similar to those made by other 19 scientists. You are talking about the 20 comments on Page 3? 21 A. I am. And I'm talking about 22 the comments made by Dr. Jay Goodman and 23 Dr. David Warheit that pushed back on the 24 studies by the NTP and the conclusion.</p>

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<p>1 Q. For purposes of your 2 analysis in this case, did you review all 3 the studies on talc miners and millers? 4 A. No, I did not. 5 Q. For purposes -- 6 A. I am not an epidemiologist. 7 Q. For purposes of your 8 analysis in this case, did you look at 9 all the studies looking at talc -- 10 looking at long-term effects of talc 11 pleurodesis? 12 MS. O'DELL: Object to the 13 form. 14 THE WITNESS: It was -- it 15 was not my question to look at -- 16 only to bring the pulmonary 17 aspects in in manners that relate 18 to ovarian effects and 19 inflammation and plausibility. 20 So, no, I did not. I 21 reviewed several studies on 22 pleurodesis, in terms of 23 understanding it, why talcum 24 powder is used, and the effect of</p>	<p>1 So when you're looking at 2 toxicology, it's not just the 3 concentration that you use. It's 4 also the length and duration and 5 frequency of the use and their 6 cumulative effects. 7 BY MR. HEGARTY: 8 Q. Is it your opinion that a 9 single particle of talc is sufficient for 10 biologic plausibility? 11 MS. O'DELL: Objection to 12 form. 13 THE WITNESS: I'm pretty 14 sure I answered that question 15 before. But I will -- again, 16 talcum powder is known to produce 17 inflammation, and inflammation is 18 known to be a biological mechanism 19 for cancer. 20 BY MR. HEGARTY: 21 Q. My question is, is a single 22 particle of talc in vivo sufficient for 23 your biologic plausibility opinion in 24 this case?</p>
Page 439	Page 441
<p>1 talcum powder on pleurodesis. 2 BY MR. HEGARTY: 3 Q. What is the volume of talc 4 that gets introduced in vivo with a 5 single application to the perineum? 6 MS. O'DELL: In pleurodesis? 7 THE WITNESS: For 8 pleurodesis? 9 BY MR. HEGARTY: 10 Q. No, just in women in 11 applying -- strike that. 12 MS. O'DELL: I'm sorry. 13 BY MR. HEGARTY: 14 Q. What is the volume of talc 15 that gets introduced in vivo with a 16 single application of talc to the 17 perineum? 18 MS. O'DELL: Objection to 19 form. 20 THE WITNESS: I do not know 21 the concentration. It depends on 22 the person and how they're using 23 it. It also depends on the 24 frequency that they are using it.</p>	<p>1 A. If it produces inflammation, 2 it could be used that way. As a matter 3 of relevancy, I don't think that there's 4 anyone who produces -- who uses a single 5 molecule. But in answer to your 6 question, if that single talc -- talcum 7 powder product produced inflammation, 8 then yes, it could -- it could be related 9 to biological plausibility. 10 Q. Can you cite any published 11 authority that supports that opinion? 12 A. That shows me that one 13 particle could produce inflammation? 14 Q. That could lead to cancer. 15 A. That could lead to cancer. 16 I cannot show you. It's not that I don't 17 know if it's there or not there. I just, 18 to my knowledge, I am not aware. 19 MR. HEGARTY: I'm going to 20 let Mr. Ferguson ask you some 21 questions for a little bit. Then 22 I will come back and finish up. 23 THE WITNESS: Okay. Thank 24 you.</p>

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<p>1 THE VIDEOGRAPHER: The time 2 is 6:00 p.m. Off the record. 3 (Short break.) 4 THE VIDEOGRAPHER: The time 5 is 6:25 p.m. Back on the record. 6 - - - 7 EXAMINATION 8 - - - 9 BY MR. FERGUSON: 10 Q. Hello, Dr. Zelikoff. 11 A. Hello. 12 Q. How are you? 13 A. Good, thank you. 14 Q. My name is Ken Ferguson, and 15 I represent Imerys, one of the parties to 16 this litigation. Do you understand that? 17 A. I understand what you said, 18 yes. 19 Q. Okay. And I'm going to have 20 some questions for you, which I'm going 21 to maybe try to go through pretty 22 quickly. But just stop me if I speed up 23 too much. I'm told that I talk slowly. 24 So maybe I won't be speeding up too much.</p>	<p>1 Q. Have you ever been elected 2 to membership in any of the national 3 academies, for example the National 4 Academy of Science? 5 A. I've not been elected as a 6 member, but I have served on the advisory 7 body numerous times. 8 Q. Okay. But you haven't been 9 elected to membership; is that right? 10 A. No, that is correct. 11 Q. Dr. Zelikoff, have you 12 communicated with any regulatory bodies 13 of any country regarding the issue of 14 talc and ovarian cancer that we've been 15 discussing today? 16 A. I have not. 17 Q. Have you communicated with 18 any scientific journals or publications 19 regarding talc and ovarian cancer? 20 A. I have not. 21 Q. So, can you turn to your 22 report, which is Exhibit Number 2. 23 A. I have it. 24 Q. Okay. Can you look at the</p>
Page 443	Page 445
<p>1 So first of all, let me just 2 go back briefly to your background and 3 qualifications. 4 A. Okay. 5 Q. Just briefly, do you 6 currently have a laboratory? 7 A. I do have a laboratory. 8 Q. And how many personnel do 9 you have employed in the laboratory? 10 A. Today? 11 Q. Yes, ma'am. 12 A. Today I have no one 13 employed, but three graduate students. 14 Q. And where does the funding 15 come from to support that laboratory? 16 A. It comes from the NIEHS, 17 National Institute of Environmental 18 Health Sciences from a center grant. And 19 that is the main source at this moment. 20 Q. Are you the principal 21 investigator of any extramural or 22 intramural funding at the current time? 23 A. I have -- as of today, I'm 24 not.</p>	<p>1 top of Page 3, please. 2 A. Yes, sir. 3 Q. And in the first full 4 paragraph on that page, it says, "My 5 opinions below are based upon my 6 experience as a toxicologist and research 7 scientist and have been reached through 8 employing the same scientific methodology 9 and rigor that I employ in my academic 10 research and professional duties." 11 Correct? 12 A. Yes, sir, I see that. 13 Q. And is that true? 14 A. That is true. 15 Q. And in your professional 16 duties and academic research, do you 17 customarily rely on peer-reviewed 18 publications in the scientific literature 19 for your research? 20 A. I do -- peer reviews, I rely 21 on. Abstracts come into play. 22 Documents. Whatever is needed, I will 23 use and cite in my publications. 24 Q. Do you customarily rely on</p>

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<p style="text-align: right;">Page 446</p> <p>1 non-peer-reviewed research that is paid 2 for by a party that has a direct 3 financial interest in the outcome of the 4 study? 5 MS. O'DELL: Object to the 6 form. 7 THE WITNESS: I go by the 8 science. I don't look at the 9 funding. Many scientists do. But 10 I think if the science is sound, I 11 look at the science -- I go by the 12 science. 13 BY MR. FERGUSON: 14 Q. Look at -- look at Page 8, 15 please. 16 A. Yes, sir. 17 Q. There in the first full 18 paragraph, you talk about recent TEM 19 testing on historic samples. 20 Do you see that sentence? 21 A. Recent TEM testing on 22 historic samples, yes. 23 Q. And you cite Longo and 24 Rigler from 2018, correct?</p>	<p style="text-align: right;">Page 448</p> <p>1 testing from the company? 2 BY MR. FERGUSON: 3 Q. And my question was, can you 4 cite any scientific articles that you've 5 authored in which you cited an 6 unpublished paper authored by an expert 7 witness who is being paid in the 8 litigation on the very topic that you're 9 writing on? 10 A. I have not had that 11 opportunity so the answer is no. 12 Q. So, you've never done that 13 in your academic writings, correct? 14 A. If you mean that -- by that, 15 that I have never cited an unpublished 16 paper authored by an expert witness? 17 Q. Yes, ma'am. 18 A. I have not done -- I have 19 not had the opportunity to do that. My 20 publications are primarily, if not 21 solely, based either on reviews or -- or 22 results that have emerged from my own 23 laboratory or a colleague's laboratory. 24 I've not had that</p>
<p style="text-align: right;">Page 447</p> <p>1 A. Mm-hmm-hmm, yes. 2 Q. Okay. And are you aware 3 that Longo and Rigler are paid expert 4 witnesses who were hired by plaintiffs' 5 counsel to testify in talc litigation, 6 including this matter you're working on? 7 A. I understand -- I understand 8 today that they are plaintiffs' 9 witnesses, experts. 10 Q. Can you cite any scientific 11 articles that you've authored in the past 12 in which you cited an unpublished paper 13 that was authored by expert witnesses 14 hired by a party in litigation on the 15 very topic that you're writing on? 16 MS. O'DELL: Objection to 17 form. 18 THE WITNESS: I relied 19 primarily on Longo. But it is, as 20 I said, or as I will say, it's a 21 Johnson & Johnson product that 22 they are testing, so in my 23 opinion, who better to know what's 24 there than someone who did the</p>	<p style="text-align: right;">Page 449</p> <p>1 opportunity. So the answer is no. 2 Q. If you look at Page 7. 3 A. Of the report? 4 Q. Of -- of your report. Yes 5 please. 6 On Page 7 you say, "In 2004, 7 a television station reported that 8 Johnson's Baby Powder had been analyzed 9 and found anthophyllite asbestos at 10 0.2 percent," correct? 11 A. I see that. That's in the 12 last paragraph. The second sentence: In 13 2004, a television station reported 14 Johnson's Baby Powder had been analyzed 15 and found anthophyllite asbestos at 16 0.2 percent, yes. 17 Q. In your previous academic 18 research, have you ever cited to stories 19 run on local television stations? 20 A. I have. 21 Q. And is that something that 22 you think shows scientific rigor? 23 MS. O'DELL: Objection to 24 form.</p>

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<p style="text-align: right;">Page 450</p> <p>1 THE WITNESS: It depends on 2 the scientific paper. And it -- 3 it depends on the source of the 4 media. 5 BY MR. FERGUSON: 6 Q. If we go to Pages 6 -- 7 A. If -- if I may add to that, 8 my recollection is that that television 9 station data was given to Johnson & 10 Johnson and it was not -- I did not cite 11 television station itself, but the -- the 12 document that was turned over to Johnson 13 & Johnson. 14 Q. If you go to Page 6 of 15 your -- 16 A. Page what, I'm sorry? 17 Q. 6. 18 A. 6? 19 Q. So on Pages 6 to 8 you cite 20 documents or other sources that you claim 21 show the presence of asbestos in talc 22 powder, correct? You -- 23 A. Pages 6 to 8? 24 Q. Yeah. Why don't you go to</p>	<p style="text-align: right;">Page 452</p> <p>1 BY MR. FERGUSON: 2 Q. And that's in your report, 3 correct? 4 A. On Page 7 at the top. 5 Q. Then you also cited 6 Dr. Blount's paper that you and 7 Mr. Hegarty talked about, correct? 8 A. I'm sorry, can you give me a 9 location? 10 Q. Sure. It's the second 11 paragraph on Page 7. 12 A. Van Gosen? 13 Q. No, the second full 14 paragraph, cosmetic and pharmaceutical 15 talc products, et cetera -- 16 A. Yes, deposition of Alice 17 Blount. Yes. 18 Q. Correct. 19 A. Sorry to interrupt. 20 Q. And Dr. Blount's paper was 21 some 30 or so years ago, correct? 22 A. 1991. 23 Q. And -- and I won't go 24 through this in detail, but Mr. Hegarty</p>
<p style="text-align: right;">Page 451</p> <p>1 the top of 7. Let me go to it 2 specifically. 3 One of the things you cite 4 to is Paoletti in 1984? 5 A. Yes, sir. 6 Q. Okay. And the Paoletti 7 study was completed -- I don't know if I 8 can do my math very well, but is that 9 36 years ago? 10 A. 36, yes. 11 Q. And you notice they have 12 assessed, according to your own report, 13 contamination in industrial and cosmetic 14 talcs, correct? 15 A. 9 of the 24 pharmaceutical 16 and cosmetic grade talcs contain 17 tremolite fibers. 18 Q. And they are from the 19 Italian market, correct? 20 A. From the Italian market. 21 MS. O'DELL: Objection to 22 form. 23 THE WITNESS: And the 24 European pharmacopeia.</p>	<p style="text-align: right;">Page 453</p> <p>1 discussed with you the fact that U.S. 2 Food and Drug Administration conducted a 3 survey of cosmetic grade raw material 4 talc and some cosmetic products 5 containing talc. And you were generally 6 aware of that, correct? 7 A. The FDA report that he -- he 8 pointed me to, yes. 9 Q. Okay. You were aware but 10 you didn't cite it, correct? 11 A. I was aware but I did not 12 cite it. 13 Q. And that came from 2010 as 14 opposed to 1984 or 1991, correct? 15 MS. O'DELL: Objection -- 16 THE WITNESS: Yes -- 17 MS. O'DELL: Excuse me. 18 Objection to form. 19 If you're going to ask a 20 specific -- about a specific date, 21 I would ask -- or a specific item 22 of that -- in that document I 23 would just ask that you show the 24 witness.</p>

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<p>1 BY MR. FERGUSON: 2 Q. Do you -- do you recall when 3 that survey was from? 4 A. The FDA was 2014. I don't 5 recall a specific. 6 Q. Well, okay. Counsel's 7 suggested it. Why don't we go ahead and 8 mark as Exhibit 37. 9 (Document marked for 10 identification as Exhibit 11 Zelikoff-37.) 12 BY MR. FERGUSON: 13 Q. And is this a document that 14 you've reviewed before? 15 A. This is a document that I 16 have reviewed, yes. 17 Q. Okay. If you look at Page 2 18 at the top of the page, in the second 19 paragraph there, it says, "The study ran 20 from September 28, 2009, to September 27, 21 2010," correct? 22 A. So I'm trying to put that 23 sentence into context. So I need to read 24 the above sentences.</p>	<p>1 Luzenac America, correct? 2 A. Correct. On the left side. 3 Q. On the left side. And on 4 the right side there are two columns that 5 say percentage asbestos by PLM and 6 percentage asbestos by TEM, correct? 7 A. I see that. 8 Q. And each of those says NAD, 9 correct? 10 A. They say NAD. 11 Q. And from your review of 12 this, do you know that NAD means no 13 asbestos detected? 14 A. Yes, I do. That means that 15 the measurements that they had and the 16 scientific -- and the sensitivities that 17 they were using at the given time, they 18 did not see any, is my interpretation of 19 that. 20 Q. According to the paper that 21 you said, NAD means no asbestos detected, 22 correct? 23 A. In this study, yes, correct. 24 Q. Let's take a look. You've</p>
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<p>1 I assume that the study they 2 are talking about was the contract with 3 the AMA analytical services to conduct 4 the laboratory survey. 5 Is that the study that they 6 are referring to? It's unclear. 7 Q. And in your review of this 8 document, did you read that there was no 9 asbestos detected by the survey by the 10 FDA in either the cosmetic grade raw 11 material talc, or the finished product 12 cosmetic products containing talc, 13 correct? 14 A. I'm trying to find where 15 that was stated. 16 Q. If you look at Page 3? 17 A. Yes, sir. 18 Q. See where it says at the top 19 of the page, "Cosmetic raw material 20 talc"? 21 A. I see that, yes, sir. 22 Q. Correct? 23 Then there is a list of 24 suppliers called Rio Tinto Minerals</p>	<p>1 cited to IARC several times during 2 your -- in your report, correct? 3 A. Yes, I did. 4 Q. And let's look at the IARC 5 monograph 100 C, which was published in 6 2012 that I've marked as Exhibit 36. 7 (Document marked for 8 identification as Exhibit 9 Zelikoff-36.) 10 THE WITNESS: Entitled 11 Arsenic Metals, Fibrous and Dusts? 12 BY MR. FERGUSON: 13 Q. Correct. 14 And if you -- I've provided 15 you a page there, correct? 16 A. You've provided me with 17 three pages. 18 Q. Okay. And was that 19 Page 225? 20 A. 225 starts 1.5 human 21 exposure. 22 Q. Okay. If you look at the 23 top of 225. Do you have that page? 24 A. Yes, sir.</p>

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<p>1 Q. In an exposure it says, 2 "Inhalation and ingestion are the primary 3 routes of exposure to asbestos," correct? 4 MS. O'DELL: Objection to 5 form. 6 BY MR. FERGUSON: 7 Q. The very first sentence. 8 A. Mm-hmm-hmm. I cannot attest 9 to ingestion, but certainly inhalation is 10 a primary. 11 Q. But you'd agree that -- that 12 this is what IARC said, correct? 13 A. I agree that this is what's 14 in IARC, yes, 2012. 15 Q. And then there's another 16 section called exposure of the general 17 population, correct? 18 A. Yes, sir. 19 Q. And in the second paragraph 20 under that, do you see that paragraph 21 starts in studies of asbestos 22 concentrations? 23 A. I do. 24 Q. Okay. And -- and let's --</p>	<p>1 A. That's what's here, yes. 2 Q. Okay. So certainly based on 3 what IARC has said, a person could inhale 4 or ingest one or more asbestos fibers 5 from the air that they breathe, correct? 6 MS. O'DELL: Objection to 7 form. 8 THE WITNESS: Based on the 9 measurements, I can't really tell 10 where they took these, where they 11 took the measurements or how they 12 measured them, from this Page 225, 13 but based on what they are saying 14 here, they have measured in 15 outdoor air and rural locations, 16 10 fibers per cubic meter, yes. 17 As I said, if you look down 18 in that paragraph it also 19 indicates that asbestos has been 20 measured in the air in a disaster 21 such as the World Trade Center, in 22 higher concentrations by 23 Dr. Longo. 24 BY MR. FERGUSON:</p>
Page 459	Page 461
<p>1 let's read it and see if it -- you and I 2 agree on what it says. 3 "In studies of asbestos 4 concentrations in outdoor air, chrysotile 5 is the predominant fiber detected. Low 6 levels of asbestos have been measured in 7 outdoor air in rural locations; typical 8 concentration, 10 fibers per cubic meter. 9 Typical concentrations are about tenfold 10 higher in urban locations and about 1,000 11 times in close proximity to industrial 12 sources of exposure, e.g., asbestos mine 13 or factory demolition site, or improperly 14 protected asbestos-containing waste 15 site," correct? 16 A. That's what's written here, 17 yes. 18 Q. Okay. And if you go down to 19 the first sentence of the next paragraph, 20 it says, "In indoor air, for example in 21 homes, schools and other buildings, 22 measured concentrations of asbestos are 23 in the range of 30 to 6,000 fibers per 24 cubic meter," correct?</p>	<p>1 Q. And then if you look at 2 Page 229. Are you with me? 3 A. Yes, I am. 4 Q. Under B, dietary exposure. 5 A. Yes. 6 Q. It says in the first 7 sentence under that paragraph heading, 8 "The general population can be exposed to 9 asbestos in drinking water," correct? 10 A. It can happen under certain 11 conditions, yes. It says, "The general 12 population can be exposed to asbestos in 13 drinking water." 14 Q. And then below it says about 15 nine lines down, "In the U.S.A., the 16 concentration of asbestos in most 17 drinking water supplies is less than one 18 fiber per milliliter even in areas with 19 asbestos deposits or with asbestos cement 20 water supply pipes." Correct? 21 A. That's what it says here. 22 Q. And then it says, "However, 23 in some locations the concentration in 24 water may be extremely high containing 10</p>

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<p style="text-align: right;">Page 462</p> <p>1 to 300 million fibers per liter or even 2 higher." Correct? 3 MS. O'DELL: Objection to 4 form. 5 THE WITNESS: That's what it 6 says here. 7 BY MR. FERGUSON: 8 Q. So -- 9 A. But it's talking about -- 10 it's talking about specific locations and 11 it's also saying "can." This is not a 12 normal situation. Normal -- this is a 13 contaminated situation. 14 Q. But as IARC said, in the 15 first line we talked about, inhalation 16 and ingestion can be routes of exposure 17 to asbestos for the general population, 18 correct? 19 A. It can be. Can being the 20 keyword. 21 Q. I've got some more questions 22 that I could ask. But I'm going to pass 23 it back to Mr. Hegarty. 24 THE WITNESS: Hello again.</p>	<p style="text-align: right;">Page 464</p> <p>1 (Whereupon, a discussion was 2 held off the record.) 3 THE VIDEOGRAPHER: The time 4 is 6:46 p.m. Back on the record. 5 - - - 6 EXAMINATION 7 - - - 8 BY MR. HEGARTY: 9 Q. Doctor, you have done a 10 number of studies looking at inhalation 11 of particles in animal species primarily, 12 correct? 13 A. In animal species primarily, 14 but also I have done studies in cell 15 culture, yes. 16 Q. In any of the studies where 17 you have looked at inhalation of 18 particles in animals, have you reported 19 finding those particles in the ovaries? 20 A. I did not look in the 21 ovaries. 22 Q. So have you ever evaluated 23 the ovaries in any study that you have 24 done?</p>
<p style="text-align: right;">Page 463</p> <p>1 MR. HEGARTY: Hello again. 2 MS. O'DELL: So are you 3 finished with your questions? 4 MR. FERGUSON: I have other 5 questions that I could ask. But 6 I'm trying to share the limited 7 time that we have. 8 MS. O'DELL: I understand. 9 I'm just trying -- typically we 10 don't go back and forth between 11 the parties. The plaintiffs' side 12 has had time to ask questions. So 13 I guess I'm just trying to figure 14 out what y'all are doing. 15 MR. HEGARTY: Let's go off 16 the record real quick and have a 17 discussion. Because what we 18 planned to do, I took the time 19 that Ken was using to organize my 20 notes and to finish up the 21 remaining time. 22 Go off the record. 23 THE VIDEOGRAPHER: The time 24 is 6:45 p.m. Off the record.</p>	<p style="text-align: right;">Page 465</p> <p>1 A. I have evaluated -- in the 2 cadmium particle studies, we looked for 3 the soluble ions, that's what we 4 measured, using atomic absorption and ICT 5 mass spec. And we did find cadmium -- 6 sorry. Sorry. We did find soluble 7 cadmium ions in the -- in the tissue -- 8 in the ovaries. 9 Q. Of what animal? 10 A. Mice. 11 Q. So there's nothing unique 12 with regard to talc in your opinion with 13 regard to its ability to transport within 14 the body, correct? 15 MS. O'DELL: Object to the 16 form. 17 THE WITNESS: Talc is a 18 fiber and will transport as a 19 fiber. It's also hydrophilic so 20 it will require some time for the 21 other products within the talc 22 molecule to be released. I am not 23 sure if I answered your question. 24 BY MR. HEGARTY:</p>

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<p>1 Q. What about platy talc? Will 2 platy talc travel in the body as cadmium 3 would travel? 4 A. Cadmium is a -- has traveled 5 as a soluble ion. So platy talc -- 6 neither platy talc nor asbestos will 7 travel as a soluble ion. They are 8 fibers. 9 Q. Have you done -- 10 A. They are -- I'm sorry, platy 11 talc is a crystal with different forms. 12 But my understanding is that platy talc 13 can fracture and also form fragments and 14 they could travel, given their size. 15 Q. Could they travel as cadmium 16 has traveled in your studies, if that 17 happens? 18 A. No, in -- in my studies we 19 did not measure -- we did not look for 20 the presence of the particle -- of the 21 nanoparticle in the tissues. We measured 22 for the metal in those tissues. 23 So we are of the opinion 24 that it was the soluble ion that was</p>	<p>1 to reach -- it can reach the deep lung, 2 if it's five micrometers or smaller. 3 And -- 4 Q. Go ahead. 5 A. And in that case since it's 6 not disposed of through the mucociliary 7 escalator, then it is in the other parts 8 of the lung and it can reach the 9 capillaries. And once it gets into the 10 bloodstream, it can be transported. 11 Certain particles have predilections for 12 where they go. 13 Q. When you say it can be 14 transported, does that include to the 15 ovaries? 16 A. Are you asking specifically 17 about talc or particles in general? 18 Q. Particles in general that 19 meet the size standards that you just 20 referenced of getting into the deep lung? 21 A. Mm-hmm-hmm. There's no 22 reason not to believe that it couldn't 23 get into the ovaries. 24 Q. Did you examine, for</p>
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<p>1 released, and in this case, I know of no 2 studies off the top of my head that 3 measured how much of the other components 4 were released. 5 Q. Can any particle that's 6 inhaled reach the ovary? 7 A. If it -- if it meets certain 8 size constituents. There's no reason why 9 a particle could not reach the ovary or 10 the kidney or the liver or -- under 11 proper circumstances. 12 Q. Is there a certain size 13 limitation? 14 A. Well, something that's 15 inhaled, is that what you're talking 16 about? 17 Q. Yes. 18 A. Something that's inhaled, if 19 it's 10 micrometers or greater, it's 20 going to be caught in the upper airways 21 and probably dismissed through the 22 mucociliary escalator. If it's of a 23 smaller nature, then depending on where 24 the impaction is for the lung, it's going</p>	<p>1 purposes of your biological plausibility 2 opinion, all the studies looking at 3 NSAIDs and use of aspirin in women with 4 ovarian cancer? 5 A. I looked at several studies. 6 I'm sure I -- 7 (Document marked for 8 identification as Exhibit 9 Zelikoff-38.) 10 BY MR. HEGARTY: 11 Q. I'm going to show you what I 12 marked as Exhibit 38, which is a study 13 that you cited by Wu 2009. 14 A. Actually, it's Merritt. 15 Q. I'm sorry. It's Merritt 16 2008, correct? 17 A. Yes. And let me find it in 18 my report. 19 Q. You cite it on Page 26. 20 Above the italicized paragraph -- 21 italicized paragraph at the bottom. 22 A. I see it. "At high 23 concentrations with chronic exposure, 24 reactive oxygen species, known as ROS,</p>

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<p style="text-align: right;">Page 470</p> <p>1 can damage cellular macromolecules and 2 contribute to neoplastic transformation 3 and/or tumor growth. Other likely 4 manifestations of talc." That's the 5 paragraph that you're referring to. 6 Q. You do agree that a relevant 7 body of literature is whether NSAIDs or 8 aspirin have an effect on ovarian cancer 9 risk, if you're considering inflammation 10 as a biologically plausibility mechanism. 11 A. NSAIDs being an -- one type 12 of anti-inflammatory, it could reduce 13 oxidative stress, yes, to different 14 degrees. 15 Q. If you look at the abstract 16 on the first page of the Merritt paper. 17 A. Yes. 18 Q. At the very end, they say, 19 "We conclude that on balance chronic 20 inflammation does not play a major role 21 in the development of ovarian cancer." 22 Do you see where I'm 23 reading? 24 A. I'm seeing the last</p>	<p style="text-align: right;">Page 472</p> <p>1 on Page 21 of your report? 2 A. Can you direct me to it? 3 Oh, I see it. Second paragraph. "Wu, et 4 al, 2009, performed a study to determine 5 the role of talc in the development of 6 ovarian cancer considering the history of 7 endometriosis." 8 Q. If you look at the abstract 9 of the Wu paper, about two-thirds of the 10 way down, it reads, "Contrary to the 11 hypothesis." 12 Do you see that start of the 13 sentence? 14 A. I do. 15 Q. "Contrary to the hypothesis 16 that risk of ovarian cancer may be 17 reduced by use of NSAIDs, risk increased 18 with increasing the frequency in years of 19 NSAID use," citing the relative risk, the 20 confidence intervals. "This was 21 consistent across types of incident." 22 Do you see where I'm 23 reading? 24 A. I do see where you're</p>
<p style="text-align: right;">Page 471</p> <p>1 sentence, yes. 2 Q. Do you agree with that 3 statement in general? 4 A. I do not agree with that 5 statement. That's -- my biological 6 plausibility is associated with the 7 oxidative stress and inflammation. Also 8 this paper was written in 2008. 9 Q. Did you cite that finding 10 that I just read anywhere in your report? 11 A. I cite Merritt. 12 Q. Do you cite for the reader 13 of your report the statement that I just 14 read in the abstract? 15 A. Not to my recollection. 16 (Document marked for 17 identification as Exhibit 18 Zelikoff-39.) 19 BY MR. HEGARTY: 20 Q. I'm showing you what I've 21 marked as Exhibit Number 39. That is the 22 Wu paper. 23 A. Mm-hmm-hmm. 24 Q. You cite the Wu paper over</p>	<p style="text-align: right;">Page 473</p> <p>1 reading. 2 Q. That finding is inconsistent 3 with inflammation as a mechanism by which 4 ovarian cancer can occur, correct? 5 MS. O'DELL: Object to the 6 form. 7 THE WITNESS: This -- NSAIDs 8 are known as antioxidants. And 9 yes, that's true, but there are 10 other antioxidants from other 11 papers that demonstrate that it 12 does indeed reduce inflammation. 13 BY MR. HEGARTY: 14 Q. Well, did you cite the 15 finding of the Wu paper with regard to 16 its data on NSAID use and the risk of 17 ovarian cancer? 18 A. I did have a section, to my 19 recollection, on the papers of Wu and 20 Merritt. 21 Q. Well, in the section that I 22 was referring to, in the middle of the 23 paragraph on Page 21, middle paragraph on 24 Page 21, you don't cite that study's</p>

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<p>1 findings as to NSAIDs and risk of ovarian 2 cancer, correct? 3 A. I do not cite that 4 particular sentence, no. 5 Q. Over on Page 23, you refer 6 to the Shukla study? 7 A. Yes, sir. 8 Q. That's second to the last 9 paragraph? 10 A. "In a molecular cell study 11 by Shukla"? 12 Q. Yes. The -- strike that. 13 Gene expressions like those 14 measured in the Shukla study occur 15 everyday in everyone, correct? 16 MS. O'DELL: Objection to 17 form. 18 THE WITNESS: There are 19 changes in genes per day. But 20 I'm -- I'm not -- I do not know 21 nor do I have knowledge of whether 22 the gene for ATF3 or ATF1 is 23 changed everyday by no exposure. 24 BY MR. HEGARTY:</p>	<p>1 proinflammatory cytokines and oxidase, 2 yes. 3 Q. Is there any study that 4 sites the clinical significance of ATF as 5 it relates to ovarian cancer risk? 6 MS. O'DELL: Object to the 7 form. 8 THE WITNESS: No study that 9 I'm currently aware of. But there 10 are many studies that link ATF 11 upregulation to inflammation and 12 then inflammation to -- in the 13 process of carcinogenesis, both 14 progression and initiation. 15 BY MR. HEGARTY: 16 Q. If you turn over to the 17 second to the last page of your report, 18 Page 27. 19 In Paragraph 3, you say that 20 exposure to talcs -- 21 A. Excuse me, Number 3? 22 Q. I called it Paragraph 3. 23 You can call it Number 3. 24 A. It's listed as Number 3.</p>
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<p>1 Q. But the -- the fact of gene 2 expression is not a -- strike that. 3 The fact that gene 4 expression occurs does not mean that 5 cancer will occur, correct? 6 A. No. My role is to look for 7 biological plausibility, and when you 8 have a transcription factor which is so 9 well immersed into oxidation and reactive 10 oxygen species and inflammation, and I 11 would say that changes or upregulation of 12 the -- of the ATF gene certainly is 13 linked with inflammation. 14 Q. Can you cite for me any 15 studies that have used measurements of 16 level -- of the levels of ATF3 to assess 17 ovarian cancer risk? 18 A. I cannot cite those studies 19 to you, but again, going back to 20 biological plausibility, I can tell you 21 that this gene is extremely important in 22 growth factors and proinflammatory 23 cytokines. So an upregulation is going 24 to lead to the production of</p>	<p>1 Q. 3. You state that "exposure 2 to talcum powder products causes an 3 inflammatory tissue reaction which may 4 result in the following," and then you 5 list -- 6 A. Elevation. 7 Q. -- a number of -- of events 8 that you label as A through F -- I'm 9 sorry, A through G carrying over to the 10 top of the next page. 11 A. I see that, thank you. 12 Q. Can you cite for me any 13 studies showing any of that activity in 14 women using talc on the perineum? 15 MS. O'DELL: Object to the 16 form. 17 THE WITNESS: If I can 18 recall the Health Canada study, I 19 think they looked at -- they also 20 included inflammatory responses 21 that are seen in some of their 22 meta-analysis. 23 BY MR. HEGARTY: 24 Q. Well, the Health Canada</p>

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<p>1 study, the Taher study, was a 2 meta-analysis, correct? 3 A. Yes, correct. 4 Q. Can you cite for me any 5 studies reporting that -- reporting these 6 events occurring in women using talc on 7 the perineum? 8 MS. O'DELL: Object to the 9 form. 10 THE WITNESS: If you're 11 asking me if gene alterations or 12 mutations or the level of 13 apoptosis has been measured in any 14 women exposed, no, I do not recall 15 that. 16 BY MR. HEGARTY: 17 Q. Have any of the processes -- 18 A. Excuse me. If I may add. 19 But inflammatory markers have been looked 20 at in women with ovarian cancer and they 21 are elevated. 22 Q. And my question, as you'll 23 recall, is specific to talc users, 24 correct?</p>	<p>1 as exhibit -- Exhibits 40 through 2 48 -- I'm sorry, 47 -- the 3 notebooks that had been produced 4 for purposes of the deposition 5 here today. 6 (Documents marked for 7 identification as Exhibits 8 Zelikoff-40 through 47.) 9 BY MR. HEGARTY: 10 Q. Over on Page 23, you -- 11 A. Of my report? 12 Q. Of your report, with regard 13 to the Shukla study. 14 I'm sorry, over on Page 26. 15 You cite again the Shukla study. Do you 16 see that where -- do you see where you 17 say "nonfibrous talc at low in vitro 18 exposure concentrations caused increased 19 expression of transcription factors 20 associated with the inflammatory process 21 in a time and dose dependent manner"? 22 A. I'm sorry, I'm not clear 23 on -- 24 Q. Middle of the second full</p>
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<p>1 MS. O'DELL: Objection to 2 form. 3 THE WITNESS: Talc -- yes, 4 talc products. 5 BY MR. HEGARTY: 6 Q. Can you -- can you cite to 7 me any studies showing elevations of any 8 of these processes in women using talc? 9 MS. O'DELL: Object to the 10 form. 11 THE WITNESS: Well, 12 neoplastic transformation and 13 proliferation is clearly seen 14 in -- obviously if there's a 15 variant answer, you've had 16 neoplastic transformation 17 proliferation. 18 BY MR. HEGARTY: 19 Q. Well, my question is 20 specific to women using talc prediagnosis 21 of ovarian cancer. 22 A. I see. No, sir. 23 MR. HEGARTY: For purposes 24 of the deposition, we want to mark</p>	<p>1 paragraph. 2 A. Not -- after the Mori 3 citation? 4 Q. Yes. 5 A. "Nonfibrous talc at low in 6 vitro exposure concentrations caused 7 increased expression of transcription 8 factors associated with the inflammatory 9 process in a time and dose dependent 10 manner." Yes, I see that. 11 Q. What did you mean by say -- 12 by time and dose manner? 13 A. May I see the paper? 14 (Document marked for 15 identification as Exhibit 16 Zelikoff-48.) 17 BY MR. HEGARTY: 18 Q. Marking as Exhibit 49 -- 48 19 that paper. 20 A. Thank you. 21 MR. TISI: We are at seven 22 hours by the way. 23 MS. O'DELL: We are at seven 24 hours?</p>

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<p>1 MR. TISI: Yes, we are.</p> <p>2 MS. O'DELL: We're at seven</p> <p>3 hours, Mark.</p> <p>4 MR. HEGARTY: Okay. Are you</p> <p>5 going to instruct her not to</p> <p>6 answer that question?</p> <p>7 MS. O'DELL: Well, the</p> <p>8 federal rules limit this</p> <p>9 deposition to seven hours and --</p> <p>10 MR. HEGARTY: No, I</p> <p>11 understand, but I also remember a</p> <p>12 deposition where I think I let</p> <p>13 Chris go over about two or</p> <p>14 three minutes.</p> <p>15 MR. TISI: Yeah, but you are</p> <p>16 using a whole new exhibit.</p> <p>17 MS. O'DELL: You just marked</p> <p>18 it --</p> <p>19 MR. HEGARTY: I just want to</p> <p>20 make sure that was --</p> <p>21 MR. TISI: Are you going to</p> <p>22 suggest --</p> <p>23 MR. HEGARTY: No, I just</p> <p>24 want to know if that -- if you</p>	<p>1 want to let her answer or not.</p> <p>2 It's simply up to you. If you say</p> <p>3 we're done, then I will -- I'm not</p> <p>4 going to dispute it.</p> <p>5 MS. O'DELL: We are -- I</p> <p>6 will let you answer that question.</p> <p>7 But after that, we're -- we're</p> <p>8 done.</p> <p>9 MR. HEGARTY: Okay. Thank</p> <p>10 you.</p> <p>11 MS. O'DELL: Do you recall</p> <p>12 the question, Dr. Zelikoff?</p> <p>13 THE WITNESS: Yes. The</p> <p>14 question is -- what -- I'll repeat</p> <p>15 it from here.</p> <p>16 What did I mean by a time</p> <p>17 and dose dependent manner?</p> <p>18 BY MR. HEGARTY:</p> <p>19 Q. Yes.</p> <p>20 A. In the Shukla study?</p> <p>21 Q. Correct.</p> <p>22 A. Well, if we look at Figure 2</p> <p>23 concerning cell viability in the Shukla</p> <p>24 paper, Page 117.</p>
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<p>1 want to end the deposition for me</p> <p>2 right here?</p> <p>3 MR. TISI: That was a fact</p> <p>4 witness, as you know.</p> <p>5 I leave it to Leigh. If</p> <p>6 we're going to -- if we're going</p> <p>7 to have this rule, we need to kind</p> <p>8 of be consistent with it.</p> <p>9 MR. HEGARTY: No, I'm not</p> <p>10 looking to apply another rule.</p> <p>11 Just tell me whether you'll let</p> <p>12 her answer the question or if the</p> <p>13 time -- because the time is up,</p> <p>14 that question will not be</p> <p>15 answered.</p> <p>16 MS. O'DELL: The time -- the</p> <p>17 time is up. What is your -- what</p> <p>18 was your question?</p> <p>19 MR. HEGARTY: My question</p> <p>20 was, "What do you mean where you</p> <p>21 say time and dose dependent</p> <p>22 manner." But I'm not going to</p> <p>23 insist on any applicable rule.</p> <p>24 I'll let you decide whether you</p>	<p>1 So we can see, I'm trying to</p> <p>2 find the exact one that I want to refer</p> <p>3 to. Figure A, one can see that in terms</p> <p>4 of the concentration and over time, that</p> <p>5 the number -- total number of viable</p> <p>6 cells were altered. And in Figure 2, 15</p> <p>7 and 75 -- no, scratch Figure 2, sorry.</p> <p>8 So on Page 118, in looking</p> <p>9 at number of genes that were</p> <p>10 significantly changed, we can see looking</p> <p>11 at the concentration -- and this is for</p> <p>12 asbestos -- there was a change in effect</p> <p>13 in asbestos. If one looks at -- I think</p> <p>14 that's it. That's what I meant.</p> <p>15 MR. HEGARTY: Okay. Thank</p> <p>16 you.</p> <p>17 MS. O'DELL: Off the record.</p> <p>18 THE VIDEOGRAPHER: The time</p> <p>19 is 7:07 p.m. Off the record.</p> <p>20 (Short break.)</p> <p>21 THE VIDEOGRAPHER: We are</p> <p>22 back on the record. The time is</p> <p>23 7:30 p.m.</p> <p>24 - - -</p>

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<p>1 EXAMINATION</p> <p>2 - - -</p> <p>3 BY MS. O'DELL:</p> <p>4 Q. Dr. Zelikoff, I have a few</p> <p>5 follow-up questions for you.</p> <p>6 Prior to your involvement in</p> <p>7 litigation, this litigation, did you hold</p> <p>8 the opinion that inflammation causes</p> <p>9 cancer?</p> <p>10 MR. HEGARTY: Objection to</p> <p>11 form.</p> <p>12 THE WITNESS: Yes. I held</p> <p>13 the opinion for a very long time</p> <p>14 that inflammation causes cancer.</p> <p>15 BY MS. O'DELL:</p> <p>16 Q. And in terms of your</p> <p>17 knowledge and opinion prior to your</p> <p>18 involvement in the litigation, did you --</p> <p>19 did you have an opinion regarding the</p> <p>20 role of oxidative stress in the</p> <p>21 development of cancer?</p> <p>22 A. Yes, I did. My opinion was</p> <p>23 that oxidative stress was closely</p> <p>24 involved with the causation of cancer.</p>	<p>1 A. I relied on his report, yes.</p> <p>2 Q. And did Dr. Crowley conclude</p> <p>3 that the chemicals involved in the</p> <p>4 fragrances for both Johnson & Johnson's</p> <p>5 Baby Powder and Shower to Shower may</p> <p>6 contribute to the inflammatory response,</p> <p>7 toxicity and potential carcinogenicity of</p> <p>8 Johnson & Johnson's talcum powder</p> <p>9 products?</p> <p>10 MR. HEGARTY: Objection to</p> <p>11 form.</p> <p>12 THE WITNESS: Yes. I concur</p> <p>13 with that whole opinion.</p> <p>14 BY MS. O'DELL:</p> <p>15 Q. And in fact, that's the</p> <p>16 specific opinion he included in his</p> <p>17 report that you relied on?</p> <p>18 A. Yes, that's correct.</p> <p>19 MR. HEGARTY: Objection to</p> <p>20 form.</p> <p>21 BY MS. O'DELL:</p> <p>22 Q. And so if another expert was</p> <p>23 also relying on Dr. Crowley's analysis,</p> <p>24 it wouldn't be surprising that the same</p>
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<p>1 Q. So to the degree that your</p> <p>2 work in this case addressed new</p> <p>3 considerations, were those considerations</p> <p>4 primarily focused on talc and its ability</p> <p>5 to cause inflammation and oxidative</p> <p>6 stress?</p> <p>7 MR. HEGARTY: Objection to</p> <p>8 form.</p> <p>9 THE WITNESS: That is</p> <p>10 correct.</p> <p>11 BY MS. O'DELL:</p> <p>12 Q. Can you -- if I could ask</p> <p>13 you to take your report. I think it's</p> <p>14 right to your left. I'm going to ask</p> <p>15 you -- if you'll turn to Page 12. Do you</p> <p>16 see that? The subsection involving</p> <p>17 fragrance, fragrance chemicals?</p> <p>18 A. Yeah. C, fragrances.</p> <p>19 Q. And did you rely on</p> <p>20 Dr. Crowley's report and his review of</p> <p>21 the relevant literature and other</p> <p>22 information regarding the chemicals that</p> <p>23 are included in the fragrance for Baby</p> <p>24 Powder and Shower to Shower?</p>	<p>1 wording was used?</p> <p>2 MR. HEGARTY: Objection to</p> <p>3 form.</p> <p>4 THE WITNESS: Absolutely</p> <p>5 not.</p> <p>6 BY MS. O'DELL:</p> <p>7 Q. Let me ask you other</p> <p>8 questions about the general principles in</p> <p>9 your report. I think you testified, you</p> <p>10 were asked a number of questions about</p> <p>11 general principals. And in your</p> <p>12 judgment, is it generally accepted to --</p> <p>13 to use common phrasing for general</p> <p>14 principles in scientific publications?</p> <p>15 A. Yes.</p> <p>16 MR. HEGARTY: Objection to</p> <p>17 form.</p> <p>18 THE WITNESS: I answered</p> <p>19 that question before, and yes.</p> <p>20 Common, well-publicized,</p> <p>21 well-established concepts, yes.</p> <p>22 BY MS. O'DELL:</p> <p>23 Q. You were asked during the</p> <p>24 early part of the day certain questions</p>

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<p>1 about whether you were an expert in areas 2 such as talc and inflammation? 3 A. Yes. 4 Q. And I think if you recall 5 the response you answered you were not 6 classified as an expert. What did you 7 mean by that? 8 MR. HEGARTY: Objection to 9 form. 10 THE WITNESS: What I meant 11 was in terms of legal, whether -- 12 one of the questions that arose 13 was, in the past, have I been 14 listed as an expert in other 15 cases. And so I followed that 16 line of thought and thought that 17 we were still talking about 18 litigation and formal declaration 19 as an expert in that area. 20 BY MS. O'DELL: 21 Q. Are you an expert in the 22 toxicological effects of minerals on 23 the -- on humans? 24 MR. HEGARTY: Objection to</p>	<p>1 A. My numerous publications in 2 that area of metal toxicology that I've 3 been doing for many, many, many years. 4 Q. And in addition to your 5 training, experience, do you also make 6 those statements based on your review of 7 the available scientific and medical 8 literature? 9 A. In regards to metals? 10 Q. In all the environmental 11 exposures we've just discussed? 12 A. Yes. I rely on 13 literature -- 14 Q. You were asked questions -- 15 A. -- as well as my own 16 scientific research. 17 Q. Excuse me. I didn't mean to 18 cut you off, Doctor. 19 You were asked questions 20 about whether there were any studies or 21 evidence that you relied on involving 22 Johnson's Baby Powder. 23 Do you recall that? 24 A. I do recall that question,</p>
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<p>1 form. 2 THE WITNESS: I'm expert in 3 toxicology of environmental 4 chemicals, including mixtures, 5 including fibers, including 6 particles, including talc. 7 BY MS. O'DELL: 8 Q. And would that -- would that 9 also include -- when you said fibers, 10 would that also include asbestos and 11 fibrous talc? 12 MR. HEGARTY: Objection to 13 form. 14 THE WITNESS: Yes. 15 BY MS. O'DELL: 16 Q. Are you an expert in the 17 toxicological effects of heavy metals on 18 the humans? 19 MR. HEGARTY: Objection to 20 form. 21 THE WITNESS: Yes, I am. 22 BY MS. O'DELL: 23 Q. And what do you base that 24 statement on?</p>	<p>1 yes. 2 Q. And do the -- strike that 3 and start again. 4 Did Dr. Saed in the testing 5 that was done and reported in not only 6 the abstracts but also his manuscript, 7 involve Johnson's Baby Powder? 8 MR. HEGARTY: Objection to 9 form. 10 THE WITNESS: Yes. 11 Dr. Saed's did. Thank you for 12 reminding me. 13 BY MS. O'DELL: 14 Q. Was Dr. Longo and Rigler's 15 testing of historical samples of talcum 16 powder products produced in this 17 litigation, including Johnson's Baby 18 Powder and Shower to Shower? 19 A. Dr. Longo stated he did use 20 products over time from Johnson & Johnson 21 talcum powders. 22 Q. And was the evidence that 23 was presented in Hopkins Exhibit 28, did 24 it involve Johnson's talcum powder</p>

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<p>1 products?</p> <p>2 A. Yes, it did.</p> <p>3 Q. Was evidence that you relied</p> <p>4 on in the form of Pier Exhibit 47, did</p> <p>5 those also involve talc that was taken</p> <p>6 from sources used to supply Johnson's</p> <p>7 talcum powder products?</p> <p>8 MR. SILVER: Objection to</p> <p>9 form.</p> <p>10 MR. HEGARTY: Objection to</p> <p>11 form.</p> <p>12 THE WITNESS: Dr. Pier?</p> <p>13 BY MS. O'DELL:</p> <p>14 Q. Yes.</p> <p>15 A. To my recollection, yes. If</p> <p>16 you'd like, I can look at the paper and</p> <p>17 confirm that.</p> <p>18 Q. Let me ask you about</p> <p>19 Dr. Blount. You were asked previously</p> <p>20 about her publication in 1991.</p> <p>21 Did Dr. Blount test</p> <p>22 Johnson's Baby Powder?</p> <p>23 A. Yes. But again, if I looked</p> <p>24 at the reference I could give you -- I</p>	<p>1 go.</p> <p>2 BY MS. O'DELL:</p> <p>3 Q. Did the FDA conclude in</p> <p>4 Exhibit 37 that -- well, let me just ask</p> <p>5 the question this way.</p> <p>6 If you'll turn to Page 2 of</p> <p>7 Exhibit 37, what was the FDA's conclusion</p> <p>8 regarding the testing that they had</p> <p>9 performed on the cosmetic powders?</p> <p>10 Doctor, I'll direct you to</p> <p>11 the second-to-the-last paragraph at the</p> <p>12 bottom of the page, the middle sentence.</p> <p>13 Do you see that, "Beginning for these</p> <p>14 reasons"?</p> <p>15 A. Yes, I see that.</p> <p>16 Q. And what was the FDA's</p> <p>17 conclusion?</p> <p>18 A. "For these reasons, while</p> <p>19 FDA finds these results informative, they</p> <p>20 do not prove that most or all talc or</p> <p>21 talc-containing cosmetic products that</p> <p>22 are currently or currently marketed in</p> <p>23 the United States are likely to be free</p> <p>24 of asbestos contamination."</p>
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<p>1 could give you specifics.</p> <p>2 Q. Okay. And do you recall</p> <p>3 that that -- did -- let me just ask it</p> <p>4 this way.</p> <p>5 Did Dr. Blount find that</p> <p>6 there was asbestos in the Johnson's Baby</p> <p>7 Powder samples that she tested?</p> <p>8 A. Yes. To my recollection,</p> <p>9 she did, yes.</p> <p>10 Q. You were asked about some</p> <p>11 testing that had been done by the FDA on</p> <p>12 certain cosmetic powders. Do you</p> <p>13 remember that? It was Exhibit 37.</p> <p>14 MS. O'DELL: And is that in</p> <p>15 the bottom of that stack, 37?</p> <p>16 Thanks, Mark. If you'll</p> <p>17 hand those to me. I appreciate</p> <p>18 it.</p> <p>19 THE WITNESS: Sorry. My</p> <p>20 microphone.</p> <p>21 MS. O'DELL: Oh, did it come</p> <p>22 off?</p> <p>23 THE VIDEOGRAPHER: Raise it</p> <p>24 up as high as possible. There you</p>	<p>1 Q. You were also asked a number</p> <p>2 of questions regarding the FDA response</p> <p>3 to Dr. Epstein's letter in April of 2014,</p> <p>4 Exhibit 33.</p> <p>5 Do you recall those</p> <p>6 questions?</p> <p>7 A. I recall that questions were</p> <p>8 asked in this regard, yes.</p> <p>9 Q. While at this point in the</p> <p>10 day, I wouldn't expect you to recall the</p> <p>11 specific question, but you recall those</p> <p>12 general discussions?</p> <p>13 A. Yes, I do.</p> <p>14 Q. All right. Let me ask you,</p> <p>15 if you wouldn't mind, to turn to Page 3</p> <p>16 of -- of Exhibit 33.</p> <p>17 And the second paragraph.</p> <p>18 A. Starting, "The survey</p> <p>19 found"?</p> <p>20 Q. Yes. Yes, ma'am.</p> <p>21 And as of April 2014, was it</p> <p>22 the FDA's conclusion that their testing</p> <p>23 results did not prove that</p> <p>24 talc-containing cosmetic powders</p>

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<p>1 currently marketed in the U.S. are free 2 of asbestos contamination? 3 MR. HEGARTY: Objection to 4 form. 5 THE WITNESS: Yes. I can 6 read the sentence, "While FDA 7 found this data informative, the 8 results were limited by the fact 9 that only four suppliers submitted 10 samples and the number of products 11 used. They do not prove that all 12 talc containing cosmetic products 13 currently marketed in the United 14 States are free of asbestos 15 contamination." 16 BY MS. O'DELL: 17 Q. Okay. While we are on this 18 Exhibit 33, Doctor, if you'll turn to 19 Page 5 of the exhibit. About two-thirds 20 of the way down, the paragraph beginning, 21 "While." 22 A. "While there exists no 23 direct proof"? 24 Q. Yes. And would you mind</p>	<p>1 causing ovarian cancer? 2 MR. HEGARTY: Objection to 3 form. 4 THE WITNESS: They are 5 consistent with my opinion, yes. 6 BY MS. O'DELL: 7 Q. Let me ask you if you would, 8 Doctor, to -- I'll do it for you. 9 Because it was marked here. 10 I'm going to hand to you the 11 Health Canada draft screening assessment 12 that was marked previously as Exhibit 9. 13 A. I see it. 14 Q. And let me ask you if you 15 would please, Doctor, first, did you 16 submit your report in this case prior to 17 Health Canada issuing the draft causal 18 assessment? 19 A. I submitted my -- my final 20 report November 15th or 16th. I'm not 21 quite clear on the date. And received 22 this or saw it for the first time in 23 January. So it did not go into my -- it 24 was not cited in my report and was not</p>
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<p>1 reading, you know, the -- the -- those 2 first two sentences of that paragraph, 3 please? 4 A. "While there exists no 5 direct proof of talc and ovarian 6 carcinogenesis, the potential for 7 particulates to migrate from the 8 peritoneum" -- "the perineum and vagina 9 to the peritoneal cavity is 10 indisputable." 11 Q. And then if you'll read the 12 next sentence? 13 A. "It is, therefore, plausible 14 that perineal talc and other particulate 15 that reaches the endometrial cavity, the 16 fallopian tubes and ovaries and the 17 peritoneum may elicit a foreign body-type 18 reaction and an inflammatory response 19 that in some exposed women may progress 20 to epithelial cancers." 21 Q. And are those statements 22 written by the FDA consistent with your 23 opinions regarding the biologic 24 plausibility of talcum powder products</p>	<p>1 reviewed for my report. 2 Q. And by virtue of the fact 3 that came out after your report, did -- 4 did the health -- strike that and start 5 again. 6 Did the Health Canada 7 assessment inform your opinions in this 8 case? 9 A. It -- it could not have 10 informed my opinion that's written out in 11 the report. It was compelling evidence 12 that helped support the opinion that I 13 came to. 14 Q. Did it confirm your 15 opinions? 16 MR. HEGARTY: Objection to 17 form. 18 THE WITNESS: Yes. It 19 confirmed my opinions on many 20 lines, including methodology. 21 BY MS. O'DELL: 22 Q. If you'll look at Page 18 of 23 the assessment. 24 A. Yes. I see it.</p>

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<p style="text-align: right;">Page 502</p> <p>1 Q. And looking at the 2 literature that is cited in this section, 3 did you cite in support of your opinions 4 Keskin 2009? 5 A. Keskin 2009, yes. 6 Q. And did you -- of course we 7 talked about it before. You cited 8 Penninkilampi 2018? 9 A. Yes, I did. 10 Q. And did you cite other 11 references included in the mode of action 12 discussion that was undertaken by Health 13 Canada on Pages 18, 19 and, you know, 20 14 of the Health Canada assessment? 15 A. Yes, I did. Do you want me 16 to tell you which ones? 17 Q. Just give us a few. Just 18 give us a few. 19 A. Henderson 1971. These are 20 the ones that come to mind readily. 21 Edelstam 1997. Egli and Newton 1961. De 22 Boer in 1972. Venter and Iturralde, 23 1979. Heller 1996. Cramer in 2007. 24 Would you like me to go on?</p>	<p style="text-align: right;">Page 504</p> <p>1 mechanism for the cause of cancer? 2 MR. HEGARTY: Objection to 3 form. 4 THE WITNESS: Biological 5 plausibility. 6 BY MS. O'DELL: 7 Q. They -- let me ask a better 8 question. Did they -- did they discuss 9 chronic inflammation, inflammation as a 10 biologically plausible mechanism for the 11 development of ovarian cancer? 12 A. Yes, they did. 13 Q. Did they discuss the role of 14 reactive oxygen species as part of the 15 biologically plausible mechanism of talc 16 in the development of ovarian cancer? 17 MR. HEGARTY: Objection to 18 form. 19 THE WITNESS: Oxidative 20 stress, yes. Yeah. React -- ROS. 21 Oxidative stress. 22 May I give the statement? 23 BY MS. O'DELL: 24 Q. Yes.</p>
<p style="text-align: right;">Page 503</p> <p>1 Q. So it's fair to say that 2 many of the references that you read, 3 reviewed, relied on in your report are 4 some of the same studies that Health 5 Canada relied on in their causal 6 assessment? 7 MR. HEGARTY: Objection to 8 form. 9 THE WITNESS: Yes. This was 10 very validating for my -- my 11 report in my opinion. 12 BY MS. O'DELL: 13 Q. Were you aware of the -- of 14 the assessment prior to it being issued 15 to the public? 16 A. Not at all. It was -- it 17 came out in late 2018, in December. 18 Q. In the assessment that was 19 undertaken by Health Canada, did they 20 assign any numerical weights in the 21 causal assessment to certain studies? 22 A. No, they do not. 23 Q. Did they discuss 24 inflammation as a sort of recognized</p>	<p style="text-align: right;">Page 505</p> <p>1 A. With respect to talc, 2 specifically local chronic irritation 3 leading to inflammatory response is one 4 possible mechanism of tumor progression 5 that is frequently hypothesized. 6 Q. And that's consistent with 7 your -- with your opinion in this case? 8 MR. HEGARTY: Objection to 9 form. 10 THE WITNESS: Yes. 11 BY MS. O'DELL: 12 Q. Is that consistent with your 13 opinion in this case? 14 A. Yes, it is. 15 Q. Did they discuss migration 16 as part of the biologically plausible 17 mechanism for the connection between 18 perineal use of talc and development of 19 ovarian cancer? 20 A. Yes, they did. 21 Q. Okay. Did they, on Page 15 22 and 16, did they discuss some of the 23 animal studies that you reference and 24 rely on in reaching your opinions in this</p>

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<p style="text-align: right;">Page 506</p> <p>1 case?</p> <p>2 A. Yes, they do.</p> <p>3 MR. HEGARTY: Objection to</p> <p>4 form.</p> <p>5 THE WITNESS: And --</p> <p>6 BY MS. O'DELL:</p> <p>7 Q. Excuse me.</p> <p>8 A. They include Hamilton et</p> <p>9 al., 1984. Keskin 2009. Hamilton 1984</p> <p>10 again. Keskin again.</p> <p>11 Q. Okay. And if you'll turn to</p> <p>12 Page 21. You'll see at the top of the</p> <p>13 page, they have a section on biologic</p> <p>14 plausibility.</p> <p>15 A. Yes, they do.</p> <p>16 Q. Is -- is their discussion of</p> <p>17 biological plausibility as outlined on</p> <p>18 Page 21 consistent with your opinions in</p> <p>19 this case?</p> <p>20 MR. HEGARTY: Objection to</p> <p>21 form.</p> <p>22 THE WITNESS: Definitely</p> <p>23 consistent. Particles of talc are</p> <p>24 hypothesized to migrate into the</p>	<p style="text-align: right;">Page 508</p> <p>1 Q. Counsel directed your</p> <p>2 attention to the sentence -- counsel for</p> <p>3 Johnson & Johnson -- direct -- directed</p> <p>4 your attention to the sentence near the</p> <p>5 bottom of the left column.</p> <p>6 A. An important finding of this</p> <p>7 study is that talc use?</p> <p>8 Q. Yeah, the -- the potential</p> <p>9 mechanism by which genital talc is</p> <p>10 associated with an increased risk of</p> <p>11 ovarian cancer --</p> <p>12 A. I'm sorry. Again,</p> <p>13 discussion on the left side?</p> <p>14 Q. Yes. At the bottom of the</p> <p>15 first paragraph, the last sentence.</p> <p>16 A. Okay. I'm sorry.</p> <p>17 "Potential mechanism by which general</p> <p>18 talc associated with an increased risk of</p> <p>19 ovarian cancer hence remains unclear."</p> <p>20 Q. And Johnson & Johnson's</p> <p>21 counsel asked you about that sentence.</p> <p>22 A. Yes, they did.</p> <p>23 Q. But they didn't ask you</p> <p>24 about other sentences in this -- this</p>
<p style="text-align: right;">Page 507</p> <p>1 pelvis and ovarian tissue causing</p> <p>2 irritation and inflammation. And</p> <p>3 the presence of talc in the</p> <p>4 ovaries as I discussed previously</p> <p>5 has been documented by Heller in</p> <p>6 1996.</p> <p>7 BY MS. O'DELL:</p> <p>8 Q. Great. Thank you.</p> <p>9 Doctor, you were also asked</p> <p>10 some questions about the Penninkilampi</p> <p>11 paper.</p> <p>12 Do you recall those?</p> <p>13 A. I do recall being asked,</p> <p>14 yeah, from that.</p> <p>15 Q. Potentially the most</p> <p>16 difficult name to pronounce in the</p> <p>17 litigation.</p> <p>18 The Penninkilampi paper</p> <p>19 was -- was marked as Exhibit 34. Do you</p> <p>20 recall that?</p> <p>21 A. I see, I see it here. Yes.</p> <p>22 Q. And if I can ask you to turn</p> <p>23 to Page 45.</p> <p>24 A. I see Page 45.</p>	<p style="text-align: right;">Page 509</p> <p>1 paper, fair?</p> <p>2 A. That's fair.</p> <p>3 Q. So if you'll look to the</p> <p>4 right column on Page 45. Do you see the</p> <p>5 sentence beginning "if chronic</p> <p>6 inflammation"?</p> <p>7 A. I do. "If chronic</p> <p>8 inflammation due to ascending foreign</p> <p>9 bodies is indeed the mechanism by which</p> <p>10 talc use is associated with increased</p> <p>11 ovarian cancer risks, then the results</p> <p>12 fit the picture."</p> <p>13 Q. Is -- is that statement that</p> <p>14 the authors of the Penninkilampi study</p> <p>15 included in their report, excuse me, in</p> <p>16 their article, is that consistent with</p> <p>17 your opinions in this case?</p> <p>18 A. It is consistent.</p> <p>19 Q. And does it confirm the</p> <p>20 opinions that you reached in this case?</p> <p>21 A. It acts to confirm, yes, it</p> <p>22 does.</p> <p>23 Q. Okay. You were asked</p> <p>24 about -- a number of questions about</p>

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<p style="text-align: right;">Page 510</p> <p>1 asbestos and the specific amount of 2 asbestos that would be introduced with 3 the perineal application of -- of talc. 4 A. Yes -- 5 Q. And let me ask you -- 6 A. -- I recall. 7 Q. You recall those questions? 8 A. Yes, I do. 9 Q. Is there any safe level of 10 asbestos -- 11 MR. HEGARTY: Objection to 12 form. 13 BY MS. O'DELL: 14 Q. -- in the perineum? 15 A. My opinion and conclusion is 16 no. 17 Q. Is asbestos a known potent 18 carcinogen? 19 A. It is. According -- 20 Q. Excuse me. Please go ahead. 21 A. According to the regulators 22 and the documents, it is, yes, a known 23 carcinogen, and it's extremely potent. 24 If you look at the effects that it causes</p>	<p style="text-align: right;">Page 512</p> <p>1 deposition of Robert Glenn in your 2 report? 3 A. I'm sorry, the deposition of 4 who? 5 Q. Robert Glenn. Page 6, about 6 midway down. 7 A. Yes, I did. "Because 8 asbestos is a known carcinogen, its 9 presence in cosmetic talc is 10 unacceptable, FDA 2012, FDA 2015." 11 Q. And do you recall that -- 12 was Mr. Glenn a former director of the 13 National Institute for Occupational 14 Safety and Health or NIOSH? 15 A. Yes. 16 Q. And what did Mr. Glenn 17 testify to regarding the presence of 18 asbestos in talc-based products? 19 A. He says, "As stated in a 20 recent deposition, that if there were a 21 fiber of asbestos in talcum-based 22 products, it would certainly 'provide a 23 biologically plausible mechanism for 24 increased lung disease' and that he</p>
<p style="text-align: right;">Page 511</p> <p>1 and at the dose levels that it causes 2 these effects. 3 Q. And of course IARC has -- 4 A. IARC has classified it as a 5 Class 1A. 6 Q. And did you review and rely 7 on IARC's conclusion regarding asbestos? 8 A. I did. 9 Q. Excuse me. And its 10 contribution to the -- to the development 11 of ovarian cancer? 12 A. Yes, I did. 13 Q. Did you review and rely on 14 IARC's conclusions regarding fibrous talc 15 or talc in an asbestiform habit regarding 16 its ability to cause ovarian cancer? 17 MR. HEGARTY: Objection to 18 form. 19 THE WITNESS: I did. 20 BY MS. O'DELL: 21 Q. If you'll turn to Page 6 in 22 your report. 23 A. Yes, I see it. 24 Q. Did you -- did you cite the</p>	<p style="text-align: right;">Page 513</p> <p>1 suspected that it would also have a 2 similar mechanism of disease in other 3 tissues and organs." 4 Q. And you were asked a number 5 of questions about the different 6 constituents of talcum powder products. 7 A. Yes. 8 Q. If talcum powder products 9 did not contain asbestos, would that 10 change your opinion about the biological 11 plausible mechanism of -- that explains 12 talc -- talc-based products causing 13 ovarian cancer? 14 A. No, it would not. 15 Q. You were asked questions 16 about a Dr. Neel from NYU. 17 A. The NYU Cancer Center. 18 Q. And you were asked if you 19 knew Dr. Neel. 20 A. Yes, I recall the question. 21 Q. And what's your 22 understanding of Dr. Neel's position? 23 A. My understanding is that he 24 is the chair -- he may not be called the</p>

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<p>1 chair -- but he is the director of the 2 cancer center for NYU Langone Health and 3 NYU Medical School. It morphs into 4 different names. 5 Q. And in regard to the 6 toxicity of talcum powder products and 7 its effects, toxicological effects, 8 would -- would you be more knowledgeable 9 about those particular effects than a 10 clinician who diagnoses and treats 11 ovarian cancer? 12 MR. HEGARTY: Objection to 13 form. 14 BY MS. O'DELL: 15 Q. Like Dr. Neel? 16 A. I'm a toxicologist, and so 17 my main area of focus and understanding 18 and literature has to do with toxicology, 19 toxicological mechanisms, toxicological 20 effects. 21 Q. So -- 22 A. So my knowledge base in 23 those areas would -- I would suspect very 24 strongly would exceed that of Dr. Neel's,</p>	<p>1 form. 2 THE WITNESS: Could you 3 clarify that question? 4 BY MS. O'DELL: 5 Q. Yeah. It was a bad 6 question. I'm sorry. I'm getting tired. 7 A. If you're asking -- would 8 you like to ask -- rephrase it, or should 9 I give you my thought of what you were 10 trying to ask? 11 Q. Well, why don't you 12 interpret my question, and I'll follow 13 up. 14 A. If you're asking me if 15 nickel was a component of the non-fibrous 16 talc, then was nickel also in place when 17 it was treated, when the cells were 18 treated? 19 Q. That's correct. 20 A. Yes, if nickel was in the 21 non-fibrous talc then, yes, it was also 22 there when the cells were being exposed. 23 Q. And so -- and that would be 24 true of chromium and cobalt?</p>
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<p>1 who is a clinician. 2 Q. You were asked some 3 questions about the Shukla paper. 4 A. Yes. 5 Q. And -- and the Shukla paper 6 involved the use of talcum powder? 7 A. Yes. 8 Q. And if the -- 9 A. Do you recall what exhibit 10 that was? 11 Q. I think it was the last 12 exhibit. 13 A. May I have a copy? 14 Q. 48. And did the Shukla 15 study involve the testing of, or the use 16 of talcum powder? 17 A. Yes. As they call it, 18 non-fibrous talc. 19 Q. And if the talcum powder 20 used in the Shukla study contained 21 nickel, that would be -- the data that 22 was reported in that study would be 23 relevant for the effects of nickel, fair? 24 MR. HEGARTY: Objection to</p>	<p>1 A. Yes. 2 Q. And so, the results from the 3 Shukla study would have bearing on the 4 effect of those heavy metals if contained 5 in talcum powder? 6 MR. HEGARTY: Objection to 7 form. 8 THE WITNESS: Yes, if they 9 were -- yes, as constituents, they 10 would -- I would imagine and know 11 that they would play -- they could 12 be playing a role in the 13 toxicity -- the cell toxicity or 14 the gene expression changes that 15 were observed. 16 BY MS. O'DELL: 17 Q. Thank you. And in regard to 18 your opinions related to cobalt, 19 chromium, and nickel, you were asked a 20 number of questions about whether there 21 were any human studies measuring the 22 effect of -- of nickel at -- in the 23 ovary. Do you recall that? 24 A. I recall that question --</p>

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<p>1 those questions.</p> <p>2 Q. Would it be possible to</p> <p>3 design a study in humans where nickel was</p> <p>4 deposited at their ovary to see if a</p> <p>5 female would develop ovarian cancer?</p> <p>6 A. I think I answered and said</p> <p>7 that would be ridiculous in the sense</p> <p>8 that this would be totally unethical to</p> <p>9 take a known carcinogen or a classified</p> <p>10 1A carcinogen and use it for experimental</p> <p>11 studies in humans by placing it in the</p> <p>12 perineal -- or anywhere within the body</p> <p>13 intentionally.</p> <p>14 Q. And would that also be true</p> <p>15 for similar reasons for cobalt and</p> <p>16 chromium?</p> <p>17 A. Yes.</p> <p>18 Q. Would the same also be true</p> <p>19 of designing a study that applied</p> <p>20 asbestos to a female's ovary for purposes</p> <p>21 of seeing if she developed cancer?</p> <p>22 A. I'm smiling because it holds</p> <p>23 true for any -- any known or suspected</p> <p>24 carcinogen cannot be used intentionally</p>	<p>1 IRBs.</p> <p>2 Q. Okay. You looked at, as I</p> <p>3 understand it, for your purposes of your</p> <p>4 task in this case, you looked at the</p> <p>5 issue of biologic plausibility for</p> <p>6 perineal talc use and ovarian cancer.</p> <p>7 A. Yes, I did.</p> <p>8 Q. Did you -- did you -- was</p> <p>9 that inquiry focused on epithelial</p> <p>10 ovarian cancer in particular?</p> <p>11 A. It -- it was -- most, if not</p> <p>12 all the studies I looked at in animals</p> <p>13 and -- were associated with epithelial</p> <p>14 ovarian cancer.</p> <p>15 Some studies in humans did</p> <p>16 look -- did break out the differences.</p> <p>17 Q. Let me ask you if you</p> <p>18 wouldn't mind, to turn to Page 8 of your</p> <p>19 report. And you'll look at the top of</p> <p>20 the page. In the first full paragraph,</p> <p>21 middle of the -- that paragraph discusses</p> <p>22 Dr. Longo and Rigler's recent report that</p> <p>23 reports that talcum powder products</p> <p>24 manufactured by Johnson's Baby Powder and</p>
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<p>1 on a human being for testing. It's</p> <p>2 unethical, and would probably in all</p> <p>3 likelihood not be approved by the</p> <p>4 institutional review board of academic</p> <p>5 institutions or any reputable scientists.</p> <p>6 Q. Would that be true of</p> <p>7 fibrous talc?</p> <p>8 MR. HEGARTY: Objection to</p> <p>9 form.</p> <p>10 BY MS. O'DELL:</p> <p>11 Q. You may answer.</p> <p>12 A. That would be true of</p> <p>13 fibrous talc.</p> <p>14 Q. Would it be true of platy</p> <p>15 talc, if there is such a thing as pure</p> <p>16 platy talc?</p> <p>17 A. If there is a -- if there is</p> <p>18 any suspicion that any product, including</p> <p>19 platy talc, might be involved in</p> <p>20 producing inflammation or any other type</p> <p>21 of adverse health effect, then it would</p> <p>22 be very unethical to go ahead and</p> <p>23 intentionally use that in a human study,</p> <p>24 in my opinion, and in the opinion of most</p>	<p>1 Shower to Shower have contained and</p> <p>2 continue to contain asbestos. Do you see</p> <p>3 that sentence?</p> <p>4 A. Yes, I do.</p> <p>5 Q. And then it goes on, you go</p> <p>6 on to report his results from test of</p> <p>7 samples manufactured from the 1960s and</p> <p>8 1990s.</p> <p>9 A. Through -- through the</p> <p>10 1990s.</p> <p>11 Q. Through the 1990s, that's</p> <p>12 correct.</p> <p>13 And you -- you have a</p> <p>14 footnote here to Footnote 7?</p> <p>15 A. Yes.</p> <p>16 Q. And Dr. Longo and Rigler's</p> <p>17 report is noted in the footnote and it's</p> <p>18 dated November 14, 2018.</p> <p>19 A. Yes.</p> <p>20 Q. Do you see that?</p> <p>21 A. Yes.</p> <p>22 Q. And just, did you have in</p> <p>23 your possession and review Dr. Rigler and</p> <p>24 Longo's November 14, 2018, report during</p>

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<p>1 the completion of your own report? 2 A. I had it available prior to 3 the submission of my final report, yes. 4 The only thing I did not 5 have was the December 2018 supplement. 6 Q. His most recent supplement? 7 A. His most recent supplement, 8 yes. 9 Q. I think just to be clear, 10 that -- was his most recent supplemental 11 report you're referring to, was that the 12 report dated in January, I think 16th or 13 15th of this month? 14 A. It was sometime in January. 15 Q. Okay. 16 A. Yes. I could answer that 17 question specifically if I saw the 18 exhibit. 19 Q. And I've handed you what's 20 been marked I think as Exhibit -- 21 A. 3. 22 Q. 3. And is Exhibit 3 the 23 supplemental report -- 24 A. Yes, it is.</p>	<p>1 that Ms. O'Dell asked you. 2 First of all, you were 3 referred to Page 12 of your report 4 under -- under Section C, Fragrances. 5 Would you go to that portion of your 6 report please? 7 A. I will, thank you. Yes. 8 I'm here. 9 Q. You were asked about this 10 part of your report being identical to 11 the same part of Smith-Bindman's report. 12 Do you recall being asked those 13 questions? 14 MS. O'DELL: Object to the 15 form. 16 THE WITNESS: Smith -- 17 Smith-Bindman report? I'm sorry, 18 I don't recall -- oh, in the 19 beginning of the deposition? 20 BY MR. HEGARTY: 21 Q. Yes. 22 A. Okay. That was a long time 23 ago. 24 Q. First of all, are you aware</p>
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<p>1 Q. -- that you reviewed 2 recently? 3 A. I'm sorry, yes. 4 Q. And what's the date on the 5 report? 6 A. January 15, 2019. 7 MS. O'DELL: Okay. I have 8 nothing further, Doctor. Thank 9 you. 10 MR. HEGARTY: Take a break. 11 I need to use the restroom. 12 THE VIDEOGRAPHER: The time 13 is 8:10 p.m. Going off the 14 record. 15 (Short break.) 16 THE VIDEOGRAPHER: We are 17 back on the record. The time is 18 8:16 p.m. 19 - - - 20 EXAMINATION 21 - - - 22 BY MR. HEGARTY: 23 Q. Dr. Zelikoff, I have some 24 questions in follow-up to the questions</p>	<p>1 that Dr. Crowley has been deposed in this 2 litigation? 3 A. Yes. 4 Q. Did you read his deposition? 5 A. I did. 6 Q. When did you read his 7 deposition? 8 A. I'm sorry, I don't recall 9 the exact date. 10 May I see Dr. Crowley's 11 deposition? 12 Q. Well, I just asked you if 13 you had read it. That's my only 14 question. 15 Other than Dr. Crowley's 16 deposition, have you read the depositions 17 of any other plaintiffs' experts deposed 18 in the MDL, this litigation? 19 A. Any of the other plaintiffs' 20 depositions? 21 Q. Correct. 22 A. Dr. Dydek. 23 Q. Anybody else? 24 A. I'm looking to see the</p>

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<p>1 others. 2 Q. It's at the end of Exhibit 3 B. 4 A. Okay. Thank you. Thank 5 you. 6 Q. Well, my question -- let me 7 ask a different question. Let me ask 8 whether you have reviewed the MDL 9 depositions; that is, the depositions 10 that plaintiffs' experts have taken in 11 this litigation over their expert reports 12 besides Dr. Crowley? 13 MS. O'DELL: Object to form. 14 THE WITNESS: Dr. Longo. 15 Sorry. 16 BY MR. HEGARTY: 17 Q. Dr. Longo has not yet been 18 deposed in -- 19 A. I read his report. 20 Q. -- for his MDL report. 21 No, I'm talking about the 22 deposition -- 23 A. I'm sorry. 24 Q. -- of an expert who has</p>	<p>1 Q. Page 12. 2 A. "There are more than 150 3 different chemicals"? 4 Q. Those four sentences, or 5 three -- or strike that. 6 The second sentence in that 7 section is not in Dr. Crowley's report. 8 He did not write, "I reviewed the expert 9 report of Dr. Michael Crowley that 10 concludes that some of these chemicals 11 may contribute to the inflammatory 12 response, toxicity, and potential 13 toxicity of Johnson & Johnson's talcum 14 powder products." 15 MS. O'DELL: Objection. 16 BY MR. HEGARTY: 17 Q. That sentence is not in 18 Dr. Crowley's report? 19 MS. O'DELL: Objection. 20 THE WITNESS: I'm terribly 21 sorry. I'm going to silence that 22 or we can and talk over it. 23 MS. O'DELL: Go ahead and 24 silence it.</p>
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<p>1 been -- who is being deposed about their 2 report in the MDL. 3 You said Dr. Crowley. Have 4 you read anyone else's deposition that 5 have discussed their report in the MDL? 6 MS. O'DELL: I think there 7 may be some confusion between 8 report and deposition. 9 THE WITNESS: Yes. There 10 was. 11 BY MR. HEGARTY: 12 Q. Did you read Dr. Crowley's 13 deposition over his report? 14 A. I read Dr. Crowley's report. 15 I'm sorry. I stand corrected. 16 Q. Dr. Crowley's report does 17 not contain the sentences that you've 18 included under your Section C, 19 fragrances, correct? 20 MS. O'DELL: Object to the 21 form. 22 THE WITNESS: What page are 23 we going back to, please? 24 BY MR. HEGARTY:</p>	<p>1 (Brief interruption.) 2 MR. HEGARTY: Let's go off 3 the record. 4 THE VIDEOGRAPHER: The time 5 is 8:21 p.m. Off the record. 6 (Whereupon, a discussion was 7 held off the record.) 8 THE VIDEOGRAPHER: The time 9 is 8:21 p.m. Back on the record. 10 BY MR. HEGARTY: 11 Q. The second sentence under 12 your section fragrances is nowhere in 13 Dr. Crowley's report? 14 A. That -- 15 MS. O'DELL: Objection to 16 form. 17 THE WITNESS: That sentence 18 is not there, but I concluded that 19 when he talked about the 20 fragrances, I concluded that -- I 21 inferred from his -- from his 22 report, that these chemicals do 23 contribute to the inflammatory 24 response, toxicity and potential</p>

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<p style="text-align: right;">Page 530</p> <p>1 carcinogenicity. 2 BY MR. HEGARTY: 3 Q. The sentence, "I concur with 4 his opinion," is not in Dr. Crowley's 5 report, is it? 6 A. No. That was my opinion. 7 Q. That same opinion, stated 8 exactly the same way, is in the 9 Dr. Smith-Bindman report, correct? 10 A. Can I see that report? 11 Q. Do you recall without 12 looking at it, that that same section is 13 in her report? 14 A. I do not. I do not recall. 15 Q. Okay. Did you -- do you 16 know -- have you ever spoken to 17 Dr. Smith-Bindman? 18 A. Not at all. 19 Q. Do you know who she is? 20 A. I don't. 21 Q. Do you know her expertise? 22 A. I do not. 23 Q. Have you ever heard her name 24 before today?</p>	<p style="text-align: right;">Page 532</p> <p>1 BY MR. HEGARTY: 2 Q. Doctor, you -- 3 A. -- that included talc. 4 Q. Doctor, you testified 5 earlier in this deposition that your 6 information as it relates to talc and 7 ovarian cancer came from the media and 8 discussion with colleagues, correct? 9 A. Prior to being contacted. 10 Q. Right. So prior to being 11 contacted for counsel for plaintiffs, you 12 had no expertise in talc and ovarian 13 cancer, correct? 14 A. As a toxicologist -- I'm 15 sorry. I'm getting hung up on the word 16 "expert" as you're using it. As a 17 toxicologist, I am familiar with talc. I 18 am familiar with much of the toxicity of 19 it. But the primary -- in discussing 20 talc and its relationship to cancer, it 21 was through colleagues and the media, 22 yes, correct. 23 Q. You had not studied, prior 24 to being contacted by plaintiffs'</p>
<p style="text-align: right;">Page 531</p> <p>1 A. Not -- not to my knowledge. 2 But I would like to see -- to refresh my 3 memory, if it's available. 4 Q. You were asked about your 5 expertise as it relates to talc and 6 inflammation. Before you were contacted 7 by Ms. Emmel, you had no expertise in 8 talc, correct? 9 MS. O'DELL: Objection to 10 form. 11 THE WITNESS: I performed no 12 scientific studies in it. 13 BY MR. HEGARTY: 14 Q. You also reviewed no 15 scientific studies concerning talc, 16 correct? 17 MS. O'DELL: Objection to 18 form. 19 THE WITNESS: I have 20 reviewed papers. I am editor and 21 associate editor on an editorial 22 board so that in my past 23 experience, I likely reviewed 24 papers --</p>	<p style="text-align: right;">Page 533</p> <p>1 counsel, any issues reported in the 2 medical literature with regard to talc 3 and ovarian cancer, correct? 4 A. I have not studied in my 5 laboratory, that's correct. 6 Q. You also did not review any 7 literature discussing talc and ovarian 8 cancer prior to being contacted by 9 counsel for plaintiff? 10 A. That is correct. 11 Q. Prior to being contacted by 12 counsel for plaintiffs you had not 13 studied the toxicology -- toxic aspects, 14 if any, of talc, correct? 15 MS. O'DELL: Object to the 16 form. 17 THE WITNESS: I have -- as I 18 stated, I have reviewed papers 19 that have looked at it. And I've 20 reviewed them for acceptance into 21 journals. 22 BY MR. HEGARTY: 23 Q. Can you cite for us today 24 any such papers?</p>

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<p>1 A. Over my career, I cannot. 2 Sorry. 3 Q. Can you identify any study 4 you have published that investigated or 5 discussed the toxicity of cobalt? 6 A. I've written review articles 7 on the toxicology of metals in general 8 and cobalt was in there, and in book 9 chapters. 10 Q. But it's your testimony that 11 you have written review papers where you 12 discussed the toxicity of cobalt? 13 A. I did not say review papers. 14 I said book chapters. 15 Q. So you had written a book 16 chapter to discuss the toxicity of 17 cobalt? 18 MS. O'DELL: Objection to 19 form. 20 THE WITNESS: I was an 21 editor of a book, several books -- 22 two books actually, which looked 23 at the toxicity of cobalt -- 24 looked at the toxicity of metals.</p>	<p>1 nickel? 2 A. Yes. 3 Q. What published article have 4 you -- have you written discussing the 5 toxicity of nickel? 6 A. One that comes to my mind, 7 without looking at my CV, is an early 8 publication associated with the 9 immunology and immunotoxicity of nickel 10 in fish. 11 Q. What nickel -- was it a 12 nickel compound? 13 A. It was a nickel chloride, a 14 soluble nickel compound. 15 Q. Are nickel compounds in 16 Johnson's Baby Powder? 17 A. Nickel -- according to the 18 J&J documents and other -- other internal 19 documents, yes. 20 Q. Okay. What nickel compounds 21 are in Johnson's Baby Powder? 22 A. The report indicates nickel. 23 It does not break it down to a particular 24 salt or a particular compound of nickel.</p>
Page 535	Page 537
<p>1 And cobalt, to my recollection, 2 was in both of those books. 3 BY MR. HEGARTY: 4 Q. Did you write those 5 chapters? 6 A. I reviewed those chapters 7 for publication in those books. 8 Q. My question was did you 9 write those chapters? 10 A. I'm sorry. Did I write 11 those chapters on cobalt? No, I did not. 12 Q. Have you ever written any 13 published chapter or article discussing 14 the toxicity of cobalt? 15 A. I have not -- 16 MS. O'DELL: Objection. 17 THE WITNESS: -- written an 18 article in the area of cobalt, but 19 I am familiar with metals, very 20 much so from the department and 21 the research that I do. 22 BY MR. HEGARTY: 23 Q. Have you written any 24 published article discussing toxicity of</p>	<p>1 Q. Have you written any papers 2 looking at the toxicity of chromium-3? 3 A. I'm going to look in my -- 4 in my CV. 5 Q. Well, without looking at 6 your CV, for purposes of time, can you 7 recall any such article? 8 MS. O'DELL: If you need to 9 take a moment, Doctor, feel free 10 to. 11 MR. HEGARTY: We'll go off 12 the record if she needs to take a 13 moment. 14 BY MR. HEGARTY: 15 Q. Because I qualified my 16 question by asking you, without looking 17 at your CV, are you able to cite an 18 article that you've written? 19 A. I want to give actual data 20 to you. In my mind, I recall a paper 21 that I wrote with Dr. Max Costa on 22 chromium. And -- and possibly with Toby 23 Rossman. But without looking, I can't be 24 absolutely sure.</p>

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<p>1 Q. You refer over on pages -- 2 or on Page 25 of your report -- 3 A. Yes. 4 Q. -- to -- 5 A. Talc-induced inflammation. 6 Q. Well, let me finish my 7 question. 8 A. Oh, I'm sorry. 9 Q. You refer over on Page 25 in 10 the fourth paragraph to an abstract and 11 other material by Dr. Harper and 12 Dr. Saed, correct? 13 A. Yes. In the last -- in the 14 last paragraph, in the last sentence. 15 Q. And none of those 16 publications refer to testing using 17 Johnson's Baby Powder, correct? 18 MS. O'DELL: Objection to 19 form. 20 THE WITNESS: To my 21 knowledge, no, but I would have to 22 look at the paper to be absolutely 23 sure. But they did use talc, 24 yes -- talcum powder.</p>	<p>1 the statements that you were asked about 2 by plaintiffs' counsel in your expert 3 report, correct? 4 MS. O'DELL: Object to form. 5 THE WITNESS: Not without 6 checking my document, I can't 7 answer conclusively. 8 BY MR. HEGARTY: 9 Q. You did not rely on this 10 portion of the FDA's letter for purposes 11 of your opinions in this case, correct? 12 MS. O'DELL: Regarding the 13 asbestos testing? 14 BY MR. HEGARTY: 15 Q. The portion that I just 16 referred you to, the top two paragraphs 17 at Page 3. 18 A. They do not prove that all 19 talc-containing cosmetic products 20 currently marketed in the United States 21 are free of asbestos. Is that -- 22 Q. Yes. 23 A. Okay. And the question was? 24 Q. You did not refer to that</p>
Page 539	Page 541
<p>1 BY MR. HEGARTY: 2 Q. Can you cite for me any 3 animal or cell studies that you reviewed 4 for purposes of preparing your report 5 that tested Johnson's Baby Powder other 6 than Dr. Saed's recent manuscript? 7 A. I know I have, I just can't 8 recall. 9 You are talking about 10 publications, correct? 11 Q. Yes. That you've cited in 12 your report. 13 A. I can't find it at the 14 moment, so I would have to say no. 15 Q. Did you find Exhibit 33, the 16 FDA's response letter to Dr. Epstein. 17 A. Thank you. 18 Q. You were referred to Page 3 19 in FDA's statement with regard to its 20 testing of samples of cosmetic grade raw 21 material talc and cosmetic products for 22 asbestos? 23 A. Yes, I did. 24 Q. You did not refer to any of</p>	<p>1 statement in your report, correct? 2 A. That is correct, yes. 3 Q. Also you did not cite on 4 Page 5 in your report the statement that 5 "it is, therefore, plausible that 6 perineal talc and other particulate that 7 reaches the endometrial cavity, et 8 cetera, may elicit foreign body-type 9 reaction and inflammatory response that 10 in some exposed women may progress to 11 epithelial cancers." 12 You did not cite that 13 sentence in your report either, correct? 14 A. I did not -- 15 MS. O'DELL: Objection to 16 form. 17 THE WITNESS: I did not cite 18 that sentence in my report either. 19 However, this document was in 20 my -- in my citations in the 21 overall reliance -- reliance 22 document. 23 BY MR. HEGARTY: 24 Q. With regard to the draft</p>

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<p style="text-align: right;">Page 542</p> <p>1 screening assessment by Canada, Canada 2 employs a precautionary principle. Are 3 you aware of that? 4 A. Yes. 5 Q. Do you know what a 6 precautionary principle is? 7 A. I do know what a 8 precaution -- 9 Q. What is it? 10 A. A precautionary principle is 11 one where you -- in my -- in my opinion 12 and what -- to my knowledge, it's a 13 principle in which you use every 14 precaution in terms of assessment, in 15 terms of use in animal models and human 16 models. You follow precaution. 17 Q. Okay. The draft screenings 18 assessment, Exhibit Number 9, contains 19 the following statement -- and I only -- 20 I only have your copy. 21 A. Oh okay. 22 Q. I'm going to read it to you 23 and tell me whether you agree with it. 24 A. Okay.</p>	<p style="text-align: right;">Page 544</p> <p>1 "The specific mechanisms and 2 cascade of molecular events by which talc 3 might cause ovarian cancer have not been 4 identified." 5 MS. O'DELL: Wait. Do you 6 mind showing Dr. Zelikoff? 7 MR. HEGARTY: Well, then I 8 won't have -- I'm just reading 9 this statement. 10 MS. O'DELL: Well, but if 11 you're reading from the draft 12 assessment -- 13 MR. HEGARTY: You know what, 14 I -- this is the only copy I have. 15 If you want to hand me your copy. 16 MR. TISI: I have my copy. 17 It has my notes on it. If you... 18 Do you want it? 19 MS. O'DELL: You're welcome 20 to my copy. 21 MR. HEGARTY: Thank you. 22 BY MR. HEGARTY: 23 Q. Page 18, second paragraph. 24 I was on Page 18, Doctor.</p>
<p style="text-align: right;">Page 543</p> <p>1 Q. "The etiology of most 2 ovarian tumors in general has not been 3 well established." 4 MS. O'DELL: What page are 5 you on, please? 6 MR. HEGARTY: Page 18. 7 BY MR. HEGARTY: 8 Q. Do you agree with that 9 statement? 10 A. Please read it again. 11 Q. "The etiology of most 12 ovarian tumors in general has not been 13 well established." 14 A. The etiology is -- has not 15 been well established. But it has been 16 studied. But there -- okay. I'm done. 17 Q. The -- on page -- strike 18 that. On Page 21 -- 19 A. Of my report? 20 Q. No, of the -- 21 A. Health Canada. 22 Q. -- health assessment states 23 the following statement and tell me 24 whether you agree with it.</p>	<p style="text-align: right;">Page 545</p> <p>1 A. You handed it to me like 2 this, sir. 3 Q. Right. On page -- I'm 4 sorry, Page 21. 5 A. This is Page 21. 6 Q. Sorry. Page 21, second 7 paragraph. The statement at the end 8 reads, "However, the specific mechanisms 9 and cascade of molecular events by which 10 talc might cause ovarian cancer have not 11 been identified." 12 Do you agree with that 13 statement? 14 MS. O'DELL: Objection to 15 form. 16 THE WITNESS: That's a 17 statement here. 18 BY MR. HEGARTY: 19 Q. Do you agree with that 20 statement? 21 A. Oh, I'm sorry. I'm sorry, 22 I've lost -- Page 21, what -- 23 Q. Page 21, second paragraph -- 24 A. -- what paragraph?</p>

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<p style="text-align: right;">Page 546</p> <p>1 Under --</p> <p>2 Q. Last two lines.</p> <p>3 A. Under --</p> <p>4 Q. Under -- in the biologic</p> <p>5 plausibility section.</p> <p>6 A. I see it. Thank you.</p> <p>7 Q. It read -- the statement</p> <p>8 reads: The specific mechanisms and</p> <p>9 cascade of molecular events by which talc</p> <p>10 might cause ovarian cancer have not been</p> <p>11 identified.</p> <p>12 Do you agree with that</p> <p>13 statement?</p> <p>14 A. Yes, they have not been</p> <p>15 clearly and conclusively identified.</p> <p>16 Q. But that's not what that</p> <p>17 sentence reads. My question was do you</p> <p>18 agree with the sentence that I just read</p> <p>19 to you.</p> <p>20 A. It is -- I think it's a</p> <p>21 sentence taken out of text.</p> <p>22 Do I agree with the sentence</p> <p>23 as it is written? No. I would have to</p> <p>24 add the words, "have not been clearly</p>	<p style="text-align: right;">Page 548</p> <p>1 today it's not -- you're not using it to</p> <p>2 inform your opinions, correct?</p> <p>3 A. It is -- it is support and</p> <p>4 validation of my opinions.</p> <p>5 Q. You referenced IARC and its</p> <p>6 designation of asbestos. What has IARC</p> <p>7 designated talc for genital uses as?</p> <p>8 MS. O'DELL: Objection.</p> <p>9 THE WITNESS: I -- in -- in</p> <p>10 terms of classification, may I</p> <p>11 look at the document?</p> <p>12 BY MR. HEGARTY:</p> <p>13 Q. Well, they've designated</p> <p>14 talc used --</p> <p>15 A. Fibrous -- fibrous --</p> <p>16 Q. -- for perineal use as 2B,</p> <p>17 correct?</p> <p>18 A. 2B, yes. Fibrous talc,</p> <p>19 correct.</p> <p>20 Q. You were asked about the</p> <p>21 deposition of Robert Glenn, correct?</p> <p>22 A. The past manager and</p> <p>23 director of NIOSH.</p> <p>24 Q. Yes.</p>
<p style="text-align: right;">Page 547</p> <p>1 identified."</p> <p>2 Q. So you don't agree with</p> <p>3 everything in the --</p> <p>4 A. Or established.</p> <p>5 Q. So you don't agree with</p> <p>6 everything in Health Canada's risk</p> <p>7 assessment, correct?</p> <p>8 MS. O'DELL: Objection to</p> <p>9 form.</p> <p>10 THE WITNESS: I -- I do not</p> <p>11 agree with this sentence, correct.</p> <p>12 BY MR. HEGARTY:</p> <p>13 Q. You do rely on, for purposes</p> <p>14 of your opinions in this case, the draft</p> <p>15 screening assessment, correct?</p> <p>16 MS. O'DELL: Objection.</p> <p>17 THE WITNESS: No. That came</p> <p>18 out well after I handed in my</p> <p>19 final report, so it was not used</p> <p>20 to inform my opinion. It was</p> <p>21 supporting validation for my</p> <p>22 opinion.</p> <p>23 BY MR. HEGARTY:</p> <p>24 Q. So still -- still through</p>	<p style="text-align: right;">Page 549</p> <p>1 A. Yes.</p> <p>2 Q. Did you read the entirety of</p> <p>3 his deposition?</p> <p>4 A. No, I did not.</p> <p>5 Q. Did you agree with</p> <p>6 everything he said in his deposition?</p> <p>7 A. I said I did not read the</p> <p>8 entirety. I can't answer.</p> <p>9 (Document marked for</p> <p>10 identification as Exhibit</p> <p>11 Zelikoff-49.)</p> <p>12 BY MR. HEGARTY:</p> <p>13 Q. I'm going to mark as</p> <p>14 Exhibit 49, portions of the deposition of</p> <p>15 Dr. Robert Glenn. If you turn to the</p> <p>16 first page of that exhibit, Page 482.</p> <p>17 A. Page 482, yes.</p> <p>18 Q. Yes. Mr. Glenn was asked in</p> <p>19 the middle of the page, Lines 12 to 14,</p> <p>20 "Has the data also showed that talcum</p> <p>21 powder is not cytotoxic, meaning it</p> <p>22 doesn't damage cells?"</p> <p>23 Mr. Glenn answer's, "Yes."</p> <p>24 A. Yes.</p>

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<p>1 Q. Did you cite that portion of 2 his testimony in your expert report? 3 MS. O'DELL: Objection to 4 form. 5 THE WITNESS: No. 6 BY MR. HEGARTY: 7 Q. Did you read it? 8 A. I said that I did not read 9 this in its -- in its entirety. 10 Q. Do you agree with that 11 sentence? 12 I'm sorry, do you agree with 13 his answer to that question? 14 MS. O'DELL: Objection to 15 form. 16 THE WITNESS: To the 17 question, "Has the data also 18 showed that talcum powder is not 19 cytotoxic, meaning it doesn't 20 damage cells?" 21 So if the question is do I 22 agree with that sentence -- do I 23 agree with his answer of yes, 24 there have been data showing, in</p>	<p>1 shows that talcum powder is not 2 mutagenic? There is. 3 Q. Did you cite that portion of 4 Mr. Glenn's testimony in your report? 5 A. No, I did not. 6 Q. If you look at the next page 7 at the top. The question, 2 through 7, 8 with the answer on 8. 9 A. Mm-hmm-hmm. 10 Q. Did you cite that question 11 and answer in your report? 12 MS. O'DELL: Object to the 13 form. 14 THE WITNESS: I did not cite 15 any of Dr. Glenn's information 16 because I -- I did not read it in 17 detail. 18 BY MR. HEGARTY: 19 Q. You can put that aside. 20 Is it your testimony that 21 you're more knowledgeable regarding talc 22 and ovarian cancer than Dr. Neel? 23 A. No, what my testimony is to 24 is that I have extensive knowledge in</p>
Page 551	Page 553
<p>1 certain circumstances, in certain 2 cell lines, that talcum powder has 3 not been shown to be cytotoxic at 4 certain concentrations. 5 BY MR. HEGARTY: 6 Q. Looking down at the next 7 question, 18 through 21, he's asked, "And 8 has the data also showed that talcum 9 powder is not mutagenic, meaning it 10 doesn't mutate genes?" 11 "Answer: Yes." 12 Do you agree with his answer 13 to that question? 14 A. I do not agree. I think 15 that the -- I do not agree with his 16 answer. I think that his -- that the 17 question has to be -- the question in my 18 opinion, it was ambiguous. And I'm not 19 sure what he was basing that on in terms 20 of his response. 21 If you -- if he was looking 22 at mutagenicity in terms of Ames assays 23 or yes, they have not shown mutagenicity. 24 So is there data that also</p>	<p>1 toxicological aspects, the cytotoxicity 2 of it, and the inflammatory responses 3 from an -- from an academic perspective 4 and a biological mechanism perspective. 5 Q. What is Dr. Neel's knowledge 6 of the toxicological aspects and the 7 toxicity of talc? 8 A. I do not know. 9 Q. What's his -- is he a 10 cancer -- strike that. 11 He is a cancer biologist, 12 correct? 13 MS. O'DELL: Objection to 14 form. 15 THE WITNESS: The only thing 16 I know about Dr. Neel is that he 17 is the director of the Cancer 18 Institute. I am not familiar with 19 his research. 20 BY MR. HEGARTY: 21 Q. Have you ever evaluated his 22 qualifications? 23 A. No. I was not on the search 24 committee nor do I have access to his CV.</p>

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<p>1 Q. You made statements 2 indicating that you believe that you are 3 more knowledgeable than Dr. Neel 4 regarding the toxicities of talc. Is 5 that true? 6 A. What I do know is that he is 7 not a toxicologist. 8 Q. Do you know what his area of 9 expertise is? 10 A. He's -- OB/GYN and oncology. 11 Q. Do you know what his level 12 of knowledge is in the area of 13 toxicology? 14 A. I do not. 15 Q. Have you ever met him? 16 A. Yes, I have met him. 17 Q. Have you ever talked to him 18 about his qualifications in the area of 19 toxicology? 20 A. No, I have not. But I know 21 he is not a -- he is not considered a 22 toxicologist by his peers, by colleagues. 23 He is known as a cancer oncologist. He 24 is not known or recognized as a</p>	<p>1 Q. Are you a board-certified 2 oncologist? 3 A. I am not, never claimed to 4 be. 5 Q. Are you a board-certified 6 gynecologic oncologist? 7 MS. O'DELL: Wait a minute. 8 THE WITNESS: I am not, nor 9 have I ever claimed to be. 10 Because -- 11 BY MR. HEGARTY: 12 Q. You were asked -- you were 13 asked about whether you could do -- 14 whether there could be studies looking at 15 risk of cancer in women exposed to 16 cobalt, chromium, and nickel. Do you 17 recall those questions? 18 A. I do. 19 Q. Studies looking at exposures 20 of metals in humans are done all the 21 time. They are called retrospective 22 case-control studies, correct? 23 A. They are not done in a 24 laboratory nor is there insertion of</p>
Page 555	Page 557
<p>1 toxicologist. 2 Q. Who have you ever asked -- 3 who have you ever spoken with regarding 4 to Dr. Neel's qualifications as it 5 relates to toxicology? 6 A. I have not spoken to him 7 about his qualifications. My answer 8 comes from the fact that I am an active 9 member in the Society of Toxicology, but 10 nationwide and internationally. And also 11 I'm an active member in the International 12 Union of Toxicology and active member in 13 the other -- other toxicology programs 14 and societies. 15 And I have -- I have not 16 seen Dr. Neel at any of these, nor have I 17 heard of him being spoken at or about in 18 these -- in these meetings. 19 Q. Do you go to OB/GYN 20 conferences? 21 A. I do not. 22 Q. Do you go to oncology 23 conferences? 24 A. I do not.</p>	<p>1 those metals into humans. 2 Q. That's not my question. You 3 said -- you testified that there is no 4 way that you can do a study looking at 5 the effect of nickel in humans. That's 6 not true, is it? 7 MS. O'DELL: Objection to 8 form. Misstates -- 9 THE WITNESS: I'm sorry. 10 MS. O'DELL: -- the question 11 and the testimony. 12 Excuse me, Doctor. 13 THE WITNESS: I was -- I was 14 talking about clinical studies and 15 studies in people. 16 BY MR. HEGARTY: 17 Q. There are retrospective 18 case-control studies looking at exposure 19 of humans to nickel, correct? 20 A. That is -- those are 21 epidemiological studies. My 22 understanding of the question that was 23 asked of me had to do with laboratory 24 studies and intentional exposure.</p>

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<p>1 Q. Well, can you cite for me 2 any epidemiologic studies showing an 3 increased risk of ovarian cancer in women 4 exposed to nickel? 5 A. Nickel alone, I have not 6 reviewed that. But I do know the IARC 7 document talks about it as a Class 1 8 carcinogen. 9 Q. Can you cite for me, any 10 retrospective case-control studies, 11 showing an increased risk of ovarian 12 cancer in women exposed to chromium? 13 A. Chromium alone? 14 Q. Yes. 15 A. No, I cannot. 16 Q. Same question as to cobalt? 17 A. No, I cannot. 18 Q. Can you cite for me any 19 case-control studies looking at whether 20 there's an increased risk of ovarian 21 cancer in women exposed to nickel, 22 chromium, and cobalt in combination? 23 A. I hope I understand your 24 question right. But what I am -- what</p>	<p>1 is not unethical, but to use it in 2 a clinical study would be 3 extremely unethical. 4 BY MR. HEGARTY: 5 Q. It would also be appropriate 6 to do cell studies looking at nickel, 7 cobalt, and chromium in ovarian cancer 8 cells, correct? 9 MS. O'DELL: Objection to 10 form. 11 THE WITNESS: Alone -- I'm 12 sorry. Alone or in combination? 13 BY MR. HEGARTY: 14 Q. Or all of the above. 15 A. Your question was it would 16 be unethical to do cell culture studies? 17 Q. Would it be unethical in 18 your opinion? 19 A. Not to do cell culture 20 studies. 21 Q. Have such studies been done? 22 A. I'm not sure about the 23 combination. There have been studies, a 24 number of studies that have been done in</p>
Page 559	Page 561
<p>1 I'm saying is yes, there is an increased 2 risk in exposure to talc because talc 3 contains, according to the J&J documents, 4 and according to other studies that just 5 looked at talcum powder products, 6 contains nickel, cobalt, and chromium in 7 elevated levels. 8 Q. My question is specific to 9 looking only at exposure to cobalt, 10 nickel, and chromium. Can you cite for 11 me any case-control studies showing an 12 increased risk of ovarian cancer in women 13 exposed to those three metals in 14 combination? 15 A. No, I can't. 16 MS. O'DELL: Objection. 17 Asked and answered. 18 BY MR. HEGARTY: 19 Q. It would not be unethical to 20 do such a case-control study, correct? 21 MS. O'DELL: Objection. 22 THE WITNESS: A case-control 23 study or an epidemiological study 24 which uses data from populations</p>	<p>1 cell culture. I can't cite them all, 2 because there are numerous that have 3 looked at nickel or cobalt or chromium in 4 cell culture studies, and many that have 5 been done in my own laboratory. 6 Q. Can you cite to me any such 7 studies that have done those tests in 8 ovarian cells? 9 A. I'm sorry. When you say 10 "any such studies," do you mean cell 11 culture studies? 12 Q. Yes. 13 A. Well, the Shukla study, the 14 Saed studies. 15 Q. So the Shukla and Saed 16 studies applied nickel, chromium and 17 cobalt to the cells? 18 A. I'm sorry. I'm sorry. I 19 thought you said talcum powder. 20 Q. Doctor, listen to my 21 question. My question is can, you cite 22 for me any culture studies that have 23 applied nickel, cobalt, or chromium or 24 all three to ovarian cancer cells?</p>

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<p>1 A. I cannot -- I have not seen 2 that literature, no. 3 Q. Those studies could be done, 4 correct? 5 A. Those studies could be done. 6 Q. They could be done in your 7 laboratory, couldn't they? 8 A. I have the facilities to 9 carry out those studies. 10 Q. You have not done those 11 studies? 12 MS. O'DELL: Objection to 13 form. 14 THE WITNESS: Correct. 15 BY MR. HEGARTY: 16 Q. You cited to the Cramer 2007 17 study, which I'm marking as Exhibit 18 Number 40. 19 (Whereupon, a discussion was 20 held off the stenographic record.) 21 (Document marked for 22 identification as Exhibit 23 Zelikoff-50.) 24 BY MR. HEGARTY:</p>	<p>1 of the first page on the right-hand 2 column. 3 A. Yes. 4 Q. The authors state that 5 the -- "First, the association is a 6 relatively weak" -- "a relatively weak 7 one; i.e., summary relative risk of 8 approximately 1.3." 9 Do you agree with that 10 statement? 11 MS. O'DELL: Objection to 12 form. 13 THE WITNESS: Number one, I 14 am not an epidemiologist so I'm 15 not testifying to epidemiological 16 odds ratio, whether that is weak 17 or not weak. 18 BY MR. HEGARTY: 19 Q. The next sentence says, 20 "Second, no clear increase in risk or 21 duration of use has been found in most 22 studies." 23 Do you agree with that 24 sentence?</p>
Page 563	Page 565
<p>1 Q. I'm marking as Exhibit 2 Number 50 the Cramer 2007 study that you 3 referred to in response to counsel's 4 questions. 5 A. Mm-hmm-hmm. 6 MS. O'DELL: Objection. 7 That misstates the record. I 8 never referred to the Cramer 9 study. 10 MR. HEGARTY: She cited it 11 in response to your questions. 12 MS. O'DELL: No, she did 13 not. But you may ask questions 14 about it, but that's not a proper. 15 MR. HEGARTY: Well, she 16 cited the Cramer 2007 article. 17 BY MR. HEGARTY: 18 Q. Do you find this article to 19 be a credible source of information for 20 you? 21 A. It was published in 22 Obstetrics and Gynecology. That is good 23 journal, reputable journal. 24 Q. And if you look at the top</p>	<p>1 MS. O'DELL: Objection to 2 form. 3 THE WITNESS: There are many 4 studies that do show that duration 5 plays a role. 6 BY MR. HEGARTY: 7 Q. That's not my question. My 8 question is do you agree with that 9 sentence? 10 A. I see. 11 MS. O'DELL: Objection to 12 form. Asked and answered. 13 THE WITNESS: I do not agree 14 that there is no clear -- there is 15 some evidence that leads to an 16 increase in risk associated with 17 duration of use. 18 BY MR. HEGARTY: 19 Q. So you don't agree with that 20 sentence? 21 A. So I do not completely agree 22 with that sentence. 23 Q. The next sentence reads, 24 "Third, the ability of talc used in the</p>

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<p style="text-align: right;">Page 566</p> <p>1 genital area to enter the pelvic cavity 2 has not been conclusively proven." 3 Do you agree with that 4 sentence? 5 A. None of these are -- none of 6 these sentences are cited or referenced 7 by the way. 8 It has not been conclusively 9 proven. I agree with the sentence. 10 May I -- 11 Q. You cited as well to the 12 Keskin paper. You cited that several 13 times, including in response to counsel's 14 questions. 15 A. Yes, I did. I recall that. 16 Q. The Keskin paper was an 17 animal study that did not show tumor 18 formation from application of talc, 19 correct? 20 MS. O'DELL: Object to the 21 form. 22 THE WITNESS: If you allow 23 me to specifically look for that, 24 please.</p>	<p style="text-align: right;">Page 568</p> <p>1 findings that led to inflammation 2 including an increased number of 3 follicles, and that goes to 4 biological plausibility. 5 BY MR. HEGARTY: 6 Q. Did you agree with that 7 finding? 8 A. That there were increased 9 number of follicles? 10 Q. Yes. 11 A. And the histopathology? 12 That there was foreign body 13 reactions and that there were infections, 14 I agree with those studies. 15 Q. Do you agree with the 16 statement that the author made that this 17 effect seems to be in the form of foreign 18 body reaction or infection rather than a 19 neoplastic change? 20 A. I'm sorry, could you tell me 21 where that might be? 22 Q. Again, in the conclusion 23 section that we have just been looking 24 at.</p>
<p style="text-align: right;">Page 567</p> <p>1 BY MR. HEGARTY: 2 Q. I'll mark it as Exhibit 51. 3 (Document marked for 4 identification as Exhibit 5 Zelikoff-51.) 6 BY MR. HEGARTY: 7 Q. The Keskin paper over in the 8 conclusion section on Page 927 says that 9 with regard to the reported effects of 10 talc, "This effect seems to be in the 11 form of foreign body reaction or 12 infection rather than a neoplastic 13 change." 14 A. Which is inflammation. 15 Q. And in this study it showed 16 no neoplastic changes in any of the 17 animal study, correct? 18 MS. O'DELL: Object to the 19 form. 20 You may answer. 21 THE WITNESS: It was -- he 22 did not find or they did not find 23 that there was neoplastic changes, 24 but they did find a number of</p>	<p style="text-align: right;">Page 569</p> <p>1 A. Mm-hmm-hmm. 2 Well, a foreign body 3 reaction can -- is an immunological 4 response. Whether it's considered a 5 neoplastic change, likely not. A foreign 6 body reaction does not necessarily -- is 7 not necessarily known as a neoplastic 8 response, correct. 9 Q. And you -- you didn't cite 10 that statement from the Keskin paper in 11 your report, did you? 12 A. Not that I recall. 13 Q. Do you agree with the -- 14 A. But my -- my role was to 15 define biological plausibility. So what 16 I did -- what I did put in my report were 17 the things that indicated to me that 18 there was inflammation. 19 Q. You agree with the 20 conclusions from the Taher paper? 21 MS. O'DELL: Object to the 22 form. 23 Doctor, it's in this stack. 24 THE WITNESS: Okay. Thank</p>

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<p>1 you. Oh, thank you. 2 BY MR. HEGARTY: 3 Q. Second page, Line 34, on the 4 second page. 5 A. In the abstract? 6 Q. Yes. 7 MS. O'DELL: Give me just a 8 moment, I'm sorry. I'll pull out 9 my copy. 10 THE WITNESS: I'm sorry, 11 should I wait? 12 MR. HEGARTY: I think Leigh 13 wants you to wait. 14 MS. O'DELL: Okay. Go 15 ahead. I'm sorry. 16 BY MR. HEGARTY: 17 Q. Do you agree with the 18 statement made in Line 34? 19 A. Perineal use of talc powder 20 is a possible cause of human ovarian 21 cancer? 22 Q. Yes. 23 A. I believe that it's more 24 than a possible cause. I believe that</p>	<p>1 counsel has it. I'll hand it to you. If 2 you'll -- 3 A. Oh. You mean the draft 4 screening assessment? 5 Q. Yes. Sorry, I was going to 6 it by the wrong name. It is Exhibit -- 7 A. 9. 8 Q. Thank you. 9 If you'll turn to Page 16. 10 A. I see that, Keskin et al., 11 2009, it's the first statement under 12 human studies. 13 Q. Yes. Right above that when 14 it refers to the Keskin and colleagues 15 2009. What was the conclusion that the 16 sentence beginning "while no cancer"? Do 17 you see that above human studies on 18 Page 16? 19 A. The conclusion, "while no 20 cancer"? 21 Q. Yes. 22 A. "While no cancer/precancer 23 effects were observed, Keskin and 24 colleagues noted the study's duration may</p>
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<p>1 there's biological plausibility which 2 shows that it -- it could be, it is 3 linked to human ovarian cancer. 4 Q. So you don't -- you disagree 5 with that statement? 6 A. One could say that, taking 7 it literally, that it is certainly a 8 possible cause. I just believe that it 9 is greater than a possible cause. 10 MR. HEGARTY: Okay. Thank 11 you. I think that's it for my 12 time. 13 MS. O'DELL: Okay. 14 - - - 15 EXAMINATION 16 - - - 17 BY MS. O'DELL: 18 Q. Doctor, I just have two 19 questions for you. 20 I think you had the causal 21 assessment in front of you. 22 A. Do you mean the Taher? 23 Q. No, ma'am. The actual 24 causal assessment -- actually I think</p>	<p>1 have been too short to note these types 2 of effects." 3 Q. And in regard to -- and 4 that -- that statement's consistent with 5 the statements that you've included in 6 your report, fair? 7 MR. HEGARTY: Objection to 8 form. 9 THE WITNESS: Yeah. 10 BY MS. O'DELL: 11 Q. And then secondly you were 12 asked a question, several questions about 13 the actual Keskin paper itself. And I 14 think it's still in front of you. Do you 15 see that? It's Exhibit 51. Yeah, 16 Exhibit 51. 17 A. This is it, thank you. 18 Q. Okay. And I'll turn you to 19 the conclusion please, Dr. Zelikoff. 20 A. That is on Page 930? 21 Q. It's 927 actually. One of 22 the conclusions, at least the ones I -- I 23 was looking at. 24 927. Do you see that?</p>

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<p>1 A. I see.</p> <p>2 Q. And counsel directed your</p> <p>3 attention to the sentence that said,</p> <p>4 "However this effect seems to be in the</p> <p>5 form of foreign body reaction or</p> <p>6 infection rather than neoplastic change."</p> <p>7 Do you see that? Recall</p> <p>8 those questions --</p> <p>9 A. In the conclusion section?</p> <p>10 Q. Yes.</p> <p>11 A. On Page --</p> <p>12 Q. 927.</p> <p>13 A. "However this effect seems</p> <p>14 to be in the form of a foreign body</p> <p>15 reaction or infection rather than a</p> <p>16 neoplastic change."</p> <p>17 Yes, I see that.</p> <p>18 Q. And if you'll look to the</p> <p>19 next sentence, what also did the authors</p> <p>20 conclude?</p> <p>21 A. "Results of previous studies</p> <p>22 are in favor of a neoplastic effect,</p> <p>23 particularly in the ovaries."</p> <p>24 And they conclude that more</p>	<p>1 dissolved in DMSO.</p> <p>2 Q. Is -- is the data included</p> <p>3 in this manuscript, was that part of</p> <p>4 the -- the data you relied on in abstract</p> <p>5 in reaching your opinions in this case?</p> <p>6 A. In abstract form, yes. That</p> <p>7 was all that was -- that was available</p> <p>8 since this only came out a few weeks ago.</p> <p>9 MS. O'DELL: Okay. I have</p> <p>10 nothing further.</p> <p>11 THE WITNESS: Accepted for</p> <p>12 E-press a few weeks ago.</p> <p>13 MS. O'DELL: Okay. I have</p> <p>14 nothing further.</p> <p>15 - - -</p> <p>16 EXAMINATION</p> <p>17 - - -</p> <p>18 BY MR. HEGARTY:</p> <p>19 Q. Dr. Zelikoff, in looking at</p> <p>20 the Keskin paper, in -- in particular at</p> <p>21 the portion of the conclusions section</p> <p>22 that counsel asked you to read --</p> <p>23 A. Yes.</p> <p>24 Q. -- the results of previous</p>
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<p>1 experimental and clinical studies are</p> <p>2 warranted.</p> <p>3 Q. All right. And one other</p> <p>4 question. You were asked about the Saed</p> <p>5 studies regarding talc and cell culture,</p> <p>6 both ovarian cancer cells and regular</p> <p>7 cells.</p> <p>8 A. Yes. I recall.</p> <p>9 Q. And you were asked earlier</p> <p>10 about the manuscript that's been marked</p> <p>11 as --</p> <p>12 A. Exhibit 8.</p> <p>13 Q. -- Exhibit 8.</p> <p>14 Is it -- is it -- turn to</p> <p>15 Page 5 of the manuscript please.</p> <p>16 A. I see it.</p> <p>17 Q. And looking at the top, did</p> <p>18 Dr. Saed use Johnson's Baby Powder as a</p> <p>19 part of the -- his treatment of cells?</p> <p>20 A. Yes. It's Page 5, top,</p> <p>21 treatment of cells, talcum powder from</p> <p>22 Fisher -- Fisher Scientific or Baby</p> <p>23 Powder from Johnson & Johnson, and the</p> <p>24 numbers of the lots are given were</p>	<p>1 studies, that sentence?</p> <p>2 A. Yes, I see it on Page 927.</p> <p>3 Q. Can you cite for me any</p> <p>4 previous studies to Keskin which were in</p> <p>5 favor of a neoplastic effect?</p> <p>6 A. Culture cell studies that</p> <p>7 have looked at proliferation, increased</p> <p>8 proliferation which was seen in the Saed</p> <p>9 studies and in the abstract.</p> <p>10 Proliferation is one hallmark of the</p> <p>11 carcinogenic process.</p> <p>12 Q. Doctor, listen to my</p> <p>13 question. This publication was in 2008.</p> <p>14 A. Okay. I'm sorry.</p> <p>15 MS. O'DELL: 2009 I believe,</p> <p>16 but go ahead.</p> <p>17 THE WITNESS: 2009.</p> <p>18 BY MR. HEGARTY:</p> <p>19 Q. Received December 2009.</p> <p>20 Published 2009.</p> <p>21 The sentence reads: The</p> <p>22 results of previous studies before 2009</p> <p>23 are in favor of neoplastic effect.</p> <p>24 What studies are they</p>

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<p style="text-align: right;">Page 578</p> <p>1 referring to?</p> <p>2 A. I don't know because it's</p> <p>3 not referenced.</p> <p>4 MR. HEGARTY: I don't have</p> <p>5 any additional questions.</p> <p>6 MS. O'DELL: Nothing</p> <p>7 further, Doctor.</p> <p>8 THE VIDEOGRAPHER: Stand by</p> <p>9 please. This marks the end of</p> <p>10 today's deposition. The time is</p> <p>11 9:03 p.m. Off the record.</p> <p>12 (Excused.)</p> <p>13 (Deposition concluded at</p> <p>14 approximately 9:03 p.m.)</p> <p>15</p> <p>16</p> <p>17</p> <p>18</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p>	<p style="text-align: right;">Page 580</p> <p>1 INSTRUCTIONS TO WITNESS</p> <p>2</p> <p>3 Please read your deposition</p> <p>4 over carefully and make any necessary</p> <p>5 corrections. You should state the reason</p> <p>6 in the appropriate space on the errata</p> <p>7 sheet for any corrections that are made.</p> <p>8 After doing so, please sign</p> <p>9 the errata sheet and date it.</p> <p>10 You are signing same subject</p> <p>11 to the changes you have noted on the</p> <p>12 errata sheet, which will be attached to</p> <p>13 your deposition.</p> <p>14 It is imperative that you</p> <p>15 return the original errata sheet to the</p> <p>16 deposing attorney within thirty (30) days</p> <p>17 of receipt of the deposition transcript</p> <p>18 by you. If you fail to do so, the</p> <p>19 deposition transcript may be deemed to be</p> <p>20 accurate and may be used in court.</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p>
<p style="text-align: right;">Page 579</p> <p>1</p> <p>2 CERTIFICATE</p> <p>3</p> <p>4</p> <p>5 I HEREBY CERTIFY that the</p> <p>6 witness was duly sworn by me and that the</p> <p>7 deposition is a true record of the</p> <p>8 testimony given by the witness.</p> <p>9</p> <p>10 It was requested before</p> <p>11 completion of the deposition that the</p> <p>12 witness, JUDITH ZELIKOFF Ph.D., have the</p> <p>13 opportunity to read and sign the</p> <p>14 deposition transcript.</p> <p>15</p> <p>16 _____</p> <p>17 MICHELLE L. GRAY,</p> <p>18 A Registered Professional</p> <p>19 Reporter, Certified Shorthand</p> <p>20 Reporter, Certified Realtime</p> <p>21 Reporter and Notary Public</p> <p>22 Dated: January 23, 2019</p> <p>23</p> <p>24</p> <p>18 (The foregoing certification</p> <p>19 of this transcript does not apply to any</p> <p>20 reproduction of the same by any means,</p> <p>21 unless under the direct control and/or</p> <p>22 supervision of the certifying reporter.)</p> <p>23</p> <p>24</p>	<p style="text-align: right;">Page 581</p> <p>1 - - - - -</p> <p>2 E R R A T A</p> <p>3 - - - - -</p> <p>4 PAGE LINE CHANGE</p> <p>5 _____</p> <p>6 REASON: _____</p> <p>7 _____</p> <p>8 REASON: _____</p> <p>9 _____</p> <p>10 REASON: _____</p> <p>11 _____</p> <p>12 REASON: _____</p> <p>13 _____</p> <p>14 REASON: _____</p> <p>15 _____</p> <p>16 REASON: _____</p> <p>17 _____</p> <p>18 REASON: _____</p> <p>19 _____</p> <p>20 REASON: _____</p> <p>21 _____</p> <p>22 REASON: _____</p> <p>23 _____</p> <p>24 REASON: _____</p>

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<p style="text-align: right;">Page 582</p> <p>1 2 ACKNOWLEDGMENT OF DEPONENT 3 4 I, _____, do 5 hereby certify that I have read the 6 foregoing pages, 1 - 583, and that the 7 same is a correct transcription of the 8 answers given by me to the questions 9 therein propounded, except for the 10 corrections or changes in form or 11 substance, if any, noted in the attached 12 Errata Sheet. 13 14 15 16 _____ 16 JUDITH ZELIKOFF Ph.D. DATE 17 18 19 Subscribed and sworn 20 to before me this 20 _____ day of _____, 20____. 21 My commission expires: _____ 22 23 _____ 23 Notary Public 24</p>	
<p style="text-align: right;">Page 583</p> <p>1 LAWYER'S NOTES 2 PAGE LINE 3 _____ 4 _____ 5 _____ 6 _____ 7 _____ 8 _____ 9 _____ 10 _____ 11 _____ 12 _____ 13 _____ 14 _____ 15 _____ 16 _____ 17 _____ 18 _____ 19 _____ 20 _____ 21 _____ 22 _____ 23 _____ 24 _____</p>	

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